Volume 4, Issue 4 APRIL, 1982

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TRS-80® Microcomputer News

Information Published for TRS-80 users.

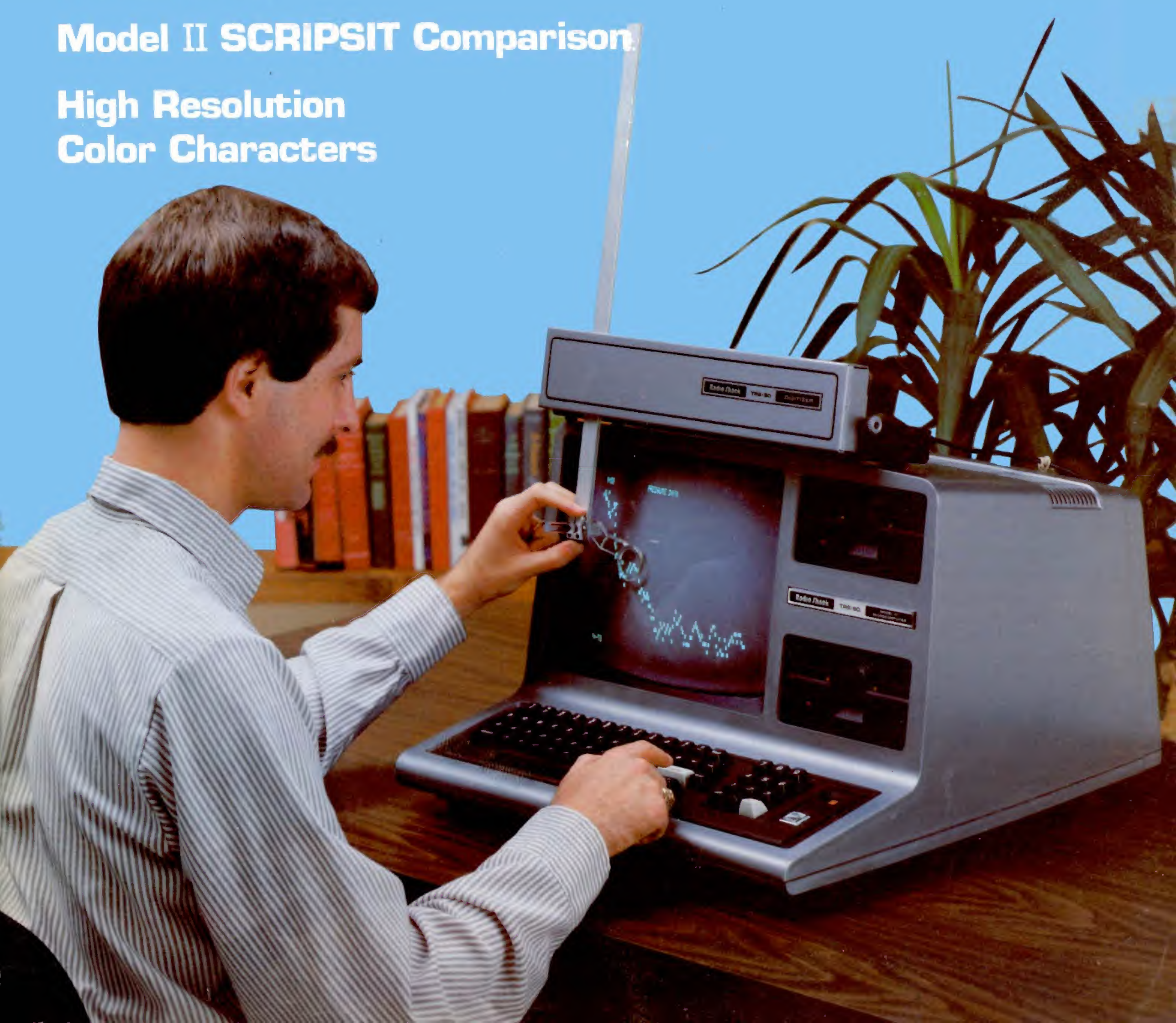
Non-Printer Peripherals

Color Computer Assembly Language

by William Barden

Model II SCRIPSIT Comparison

High Resolution Color Characters



Fort Worth Scene

There is a change coming soon to Computer Customer Service which—not surprisingly—involves our telephone system.

What is the change? We are discontinuing the toll-free (WATS) lines and replacing them with regular toll lines.

Why the change? Simply because a WATS system is unable to provide you what we know you require most, i.e., prompt access to assistance. Any of you who have tried to reach the Customer Service Department can attest to the foregoing.

To those who may be asking: "Why not install more WATS lines?" The answer is WE HAVE. Fifty-three of them to be exact, with staff to match. The result was no significant improvement of accessibility. Instead, more lines simply seem to prompt more calls and many thousands of those calls are not related to our mandated purpose, which is helping our users with implementing our software or using our hardware.

How will the new telephone system improve accessibility? It will have a direct and indirect effect. First, it will eliminate some of the superfluous calls, leaving more representatives available to assist those who really need help, and it will eliminate those lengthy "holds." Adequate staffing of the lines is assured (although it will take us a month or two to get the proper balance between support groups after the new system is installed). If we need more representatives to staff the lines, we will get them. That is a promise from top management.

Secondly, and more indirectly, we hope this change will encourage many of our customers to rely upon the qualified Customer Service Representative at their local Radio Shack Computer Center. Very soon, we will have a Computer Center in every major (and many not-so-major) markets in the country. Our Vice President of Marketing is firmly committed to staffing the Customer Service positions in most of those Computer Centers with the most capable, informed individuals available. If these local people are unable to answer your questions or resolve your particular problem, they have access to support groups in Fort Worth who are dedicated to supporting only them (i.e., the Representatives at the Centers), in effect, a secondary line of support. Your question will be answered or your problem resolved with a minimum of delay in the majority of instances.

It should be pointed out that by using your RSCC Customer Service Representative, you get to know him and he in turn becomes familiar with you, your system and applications. In essence, you have your own consultant who can relate to your particular needs.

When will the change take effect? June 1, 1982.

It is important to us that you understand our motives for making this change. COST SAVINGS IS NOT THE REASON. As a matter of fact, Radio Shack's nationwide Customer Service Team will be expanded from its present 60-plus to over 200 nationwide and the sole purpose is to provide you with better service. Decentralizing and enlarging our Customer Service Support function is a significant first step towards accomplishing that task.

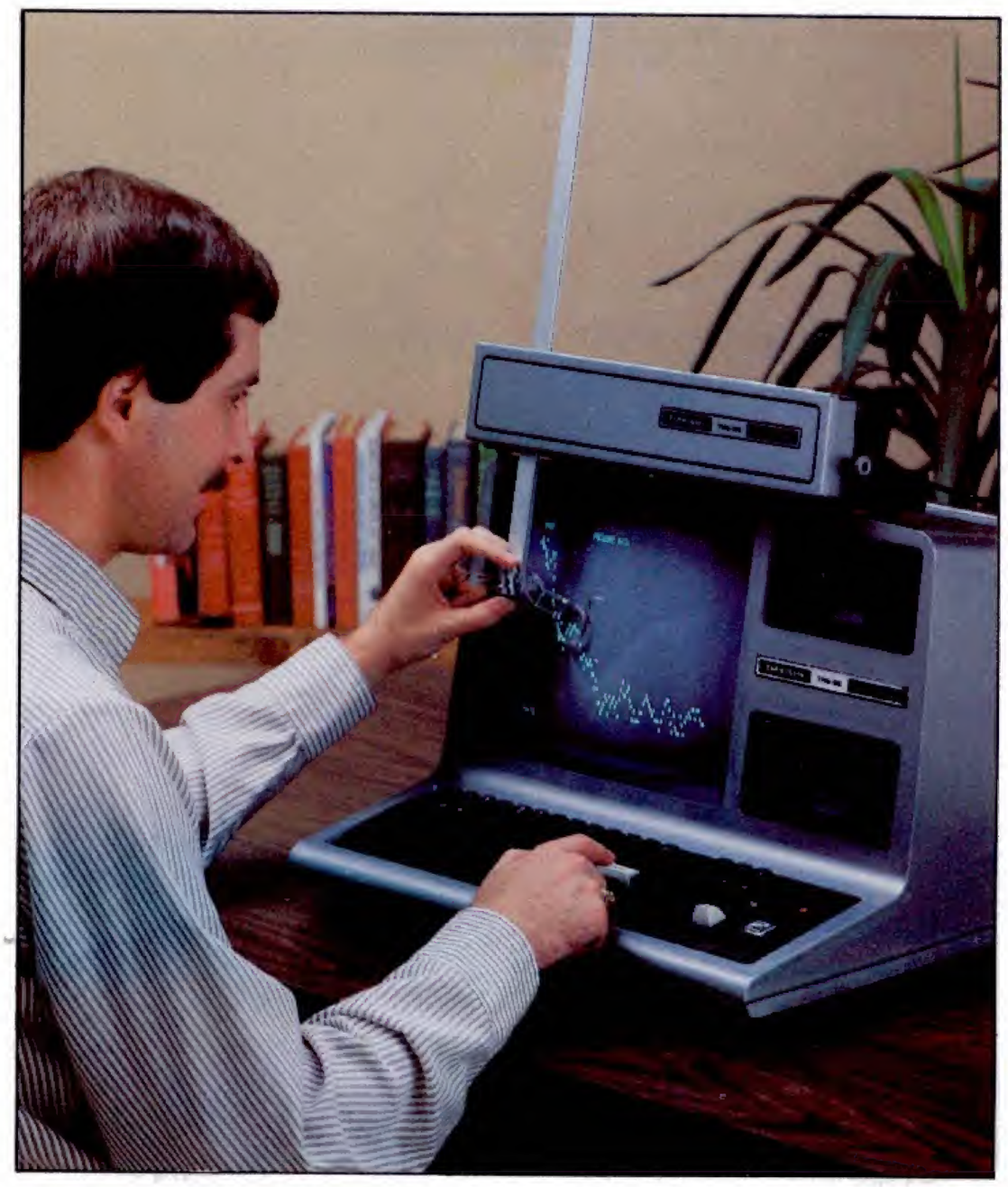
Please check the May Microcomputer News for more details on the forthcoming change.

—Director of Computer Customer Services

Computer Clubs

WML TRS-80 Computer Group
c/o Steve Bergers
2040 Janes Avenue NE
Grand Rapids, MI 49505
1-616-3636-3561

Appraiser's TRS-80
c/o Dan D. Swearingin, MAI, SREA
1215 Fruit, NW
Albuquerque, N.M. 87102
1-505-842-1700



Radio Shack's TRS-80 Digitizer is versatile enough to digitize from many surfaces, including your video display (as shown on this month's front cover). The adjustable crosshair piece gives you even more flexibility.

TRS-80 Microcomputer News is published monthly by Radio Shack, a division of Tandy Corporation. A single six month subscription is available free to purchasers of new TRS-80 Microcomputer systems with addresses in the United States, Puerto Rico, Canada and APO or FPO addresses. Subscriptions to other addresses are not available.

The subscription rate for renewals and other interested persons with U.S., APO or FPO addresses is twelve dollars ($12.00) per year, check or money order. Single copies of the Microcomputer News may be purchased from Radio Shack Computer Centers or Computer Departments for $1.50 (suggested retail) each. The subscription rate for renewals and other interested persons with Canadian addresses is Fifteen dollars ($15.00) per year, check or money order in U.S. funds. All correspondence related to subscriptions should be sent to: Microcomputer News, P.O. Box 2910, Fort Worth, Texas 76113-2910.

Retail prices in this newsletter may vary with individual stores and dealers. The company cannot be liable for pictorial and typographical inaccuracies.

Back issues of Microcomputer News prior to January, 1981 are available through your local Radio Shack store as stock number 26-2115 (Suggested Retail Price $4.95 for the set). Back issues of 1981 copies are not available.

The TRS-80 Newsletter welcomes the receipt of computer programs, or other material which you would like to make available to users of TRS-80 Microcomputer systems. In order for us to reprint your submission, you must specifically request that your material be considered for reprinting in the newsletter and provide no notice that you retain copyrights or other exclusive rights to the material. This assures that our readers may be permitted to recopy and use your material without creating any legal hassles.

Material may be submitted by mail to P.O. Box 2910, Fort Worth, Texas 76113-2910, or through CompuServe. The Microcomputer News' CompuServe user ID number is 70007,535.

Notes to Program Users:

Programs published in the Microcomputer News are provided as is, for your information. While we make reasonable efforts to ensure that the programs we publish here work as specified, Radio Shack can not assume any liability for the accuracy either of the programs themselves, or of the results provided by the programs.

Further, while Microcomputer News is a product of Radio Shack, the programs and much of the information published here are not Radio Shack products, and as such can not be supported by our Computer Customer Service group. If you have questions about a program in the Microcomputer News, your first option is to write directly to the author of the program. When possible, we are now including authors' addresses to facilitate communications. If the address is not published, or if you are not happy with the response you get, please write us here at Microcomputer News. We will try (given the limited size of our staff) to find an answer to your question and, in many cases, will publish the answer in an up-coming issue of Microcomputer News.

Comments on our program listing style:

In order to make the program listings we publish easier to read, we have adopted a style of inserting spaces to enhance readability, and we separate each program statement onto a separate line. While these techniques increase program readability, they also require more memory, and may execute more slowly then the original program did.

When you are entering a program for your own use, you may wish to eliminate many of the extra blanks (see your owners manual for required blanks), and you should certainly move multiple statements up to a single line where possible.

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Time Manager™	Image Producers
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TRSDOS™	Tandy Corporation
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TRS-80® Microcomputer News

Volume 4, Issue 4 **APRIL, 1982**

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Contents:

View From The Seventh Floor

Jon Shirley
Vice President, Radio Shack Computer Merchandising

I had hoped I could devote this column to a subject other than one caused by my reading, but no such luck. I have been very busy what with our new models and got behind on my reading but a bunch of customer letters forced me to pick up the January '82 issue of 80 Microcomputing and read Mr. Wayne Green's column, 80 REMARKS. In this incredible column he states that he has heard a rumor from our dealers that the Color Computer will be phased out!

He did not call us because "I have not called the factory about this because if it is true they will probably deny it. If it is false they will also deny it. So why waste money on the phone call?" Well, if Mr. Green had not been so tight with his nickel he would have heard a denial so strong he might not have published such rubbish and saved us all a lot of aggravation.

My response to Mr. Green follows intact. It was also sent to all those many Color Computer owners who wrote:

January 21, 1982

Wayne Green, Editor
80 Microcomputing
Elm Street at Rt. 101
Peterborough, New Hampshire 03458

Dear Mr. Green:

As the publisher of several magazines it seems you have the power to print virtually any personal opinion of yours as well as any unsubstantiated rumor no matter how far wrong you are. In the past we have tended to ignore your monthly misinformation about Radio Shack as it did no one harm except, perhaps, yourself.

I must, however, take strong exception to your 80 Remarks column of January, 1982, in which you state that we are likely to drop the TRS-80 Color Computer.

That statement is absolutely untrue and is causing unnecessary anxiety on the part of our Color Computer owners. We just finished a terrific Christmas season with the Color Computer in which we sold out our entire warehouse supply. Contrary to your comments about no advertising, the Color Computer had more advertising September through December than any other TRS-80, which included a great deal of national TV advertising.

Our March computer catalog will list 26 Program Paks and 8 cassette programs for the Color Computer, and we have over 40 Program Paks, cassette and disk packages in the works. In addition to the current peripherals there are three additional hardware products for the Color Computer in design.

So, Wayne, sorry, but you are dead wrong! The Color will not be dropped in 1982, or in 1983 for that matter. It is a highly successful product and stands a good chance of being the number one unit selling computer in America this year.

If you believe in responsible journalism you will publish this letter as soon as possible, and, in the meantime, I will send it to those customers who are calling us who, unfortunately, believe that if something is in print, it is true.

Sincerely,
Jon Shirley
Vice President, Merchandising
Computer Products

P.S. You are also wrong on the Pocket Computer. We sold more of those the first 12 months of its life than we sold Model I's the first year of its life. And we just introduced its new brother.

In the article Mr. Green also decided to comment on why we would drop the Color Computer. "neglected, underadvertised, underdeveloped . . . and then phased into oblivion." Well part of that phase into oblivion will occur in two months when the Color Computer factory will move into a brand new building about three times larger than the current one. And underadvertised? Did you watch the start of the Super Bowl? That Color Computer spot cost in the six figures and comes after the most intensive TV fall series we have ever run on a single product. I guess Wayne does not watch football games or the Today show or the late news or????

I think the Color Computer is a great product. And we have a lot of plans to make it a greater product. There is already more software available from us after one year of selling the Color Computer than we had for the Model I after two years and, as I said in my letter, there is a lot more coming.

If I sound a little emotional, I guess I am. I just do not think that journalists should be allowed to print a total untruth when it harms many other people. It is not my people I am talking about, it is those Color Computer owners who subscribed in good faith to 80 Microcomputing and who called us to ask why we would do such a stupid thing as dropping the Color Computer. So, Wayne, if you read my column, please call us the next time, even collect, before you draw your pen from its holster.

And you Color Computer owners—send Wayne a few articles. That might make him a believer since he does not seem to read his competition where I have seen a lot of C.C. coverage.

Until next month.

Non-Printer Peripherals

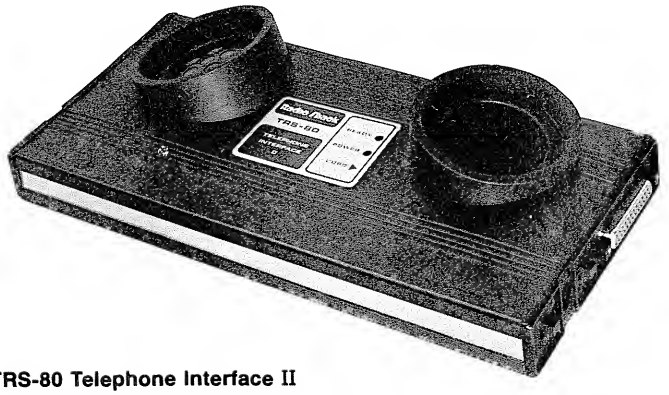
A quick look at the non-printer peripherals listed in our current Computer Catalog (RSC-7) reveals a number of items, most of which seem to fall into three categories: RS-232C devices, disk drives, and cassette-port oriented devices. We will look at two of these categories, RS-232C devices and cassette-port devices.

RS-232C DEVICES

With the exception of the Pocket Computer (PC-1, Cat. No. 26-3501) and the Level I Model III, each of Radio Shack's TRS-80 Computers either comes with at least one RS-232C port, or can have one added as an optional extra.

MODEMS

The most obvious RS-232C devices which Radio Shack offers are our three modems. A modem has two functions. The first is to modulate (translate) the information provided by the RS-232 port on your computer into tones which can be transmitted over ordinary telephone lines. The second function is to demodulate (again, translate) the audio tones which come over the telephone lines into RS-232C signals which can be understood by your computer. The word modem was created by combining the words for these two functions (MOdulate/DEModulate.)



TRS-80 Telephone Interface II

Assuming that you have the proper software, a modem can open up a whole new world to you and your computer. Two of the more obvious things you can do with a modem and software are to connect your computer, via telephone lines, with the CompuServe Information Service and the Dow Jones News/Retrieval Service. As the articles (run each month in Microcomputer News) on these two services point out, a whole world of information exists which you can access through a modem.

Another common use for modems is to let two individuals (again, with proper software), possibly with different

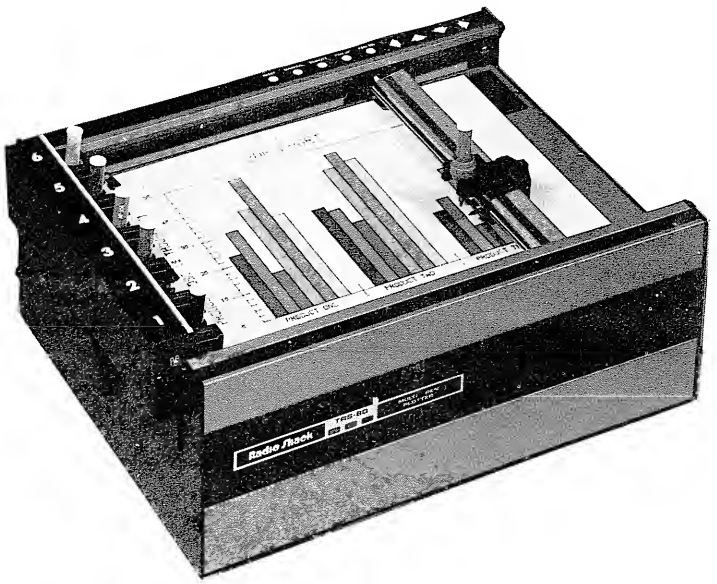
TRS-80 Direct Connect Modem I

types of computers, communicate and transfer both information and programs. We have used a pair of Telephone Interface IIs here at the Microcomputer News to allow one of our Model IIs to transfer BASIC programs to our Color Computer. Eventually we will probably create a single cable to connect the two machines together, but until that happens, we use modems. And, each month two or three of the articles we run are sent via telephone lines and modems.

TRS-80 Direct Connect Modem II

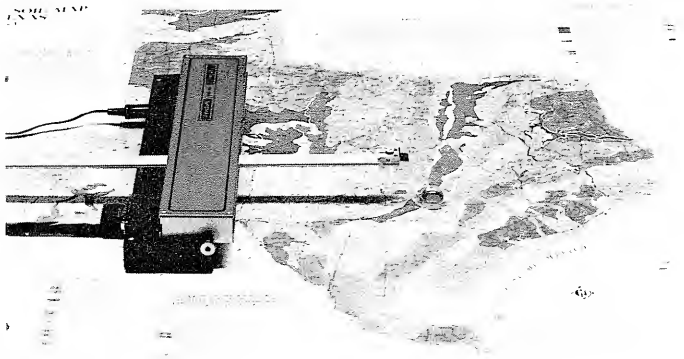
OTHER RS-232 DEVICES

Radio Shack currently offers two other non-printer RS-232C devices. These are the Multi-Pen Plotter and our Digitizer.



TRS-80 Multi-Pen Plotter

Radio Shack's Tandy-graph software package (a simple graph creation routine) is available, at no additional cost, for Models I, II, III and the Color Computer with the purchase of the Multi-Pen Plotter. Tandy-graph can be used to create pie charts, line graphs and bar graphs.



TRS-80 Digitizer

The Digitizer is a very versatile product which should let you input two-dimensional data to your programs from almost any type surface you want, including your video screen!

NEW PRODUCTS

Radio Shack is now offering eight new RS-232C cables or adaptors. The first five of these items are RS-232C cables:

Stock Number	Description	Suggested Retail Price
26-1490	10 foot RS-232C Cable	$29.95
26-1491	25 foot RS-232C Cable	$39.95
26-1492	50 foot RS-232C Cable	$54.95
26-1493	100 foot RS-232C Cable	$89.95
26-1494	5ft. 4 pin to Network III	$19.95

These cables have molded strain-relief plugs and round cables.

Since the Model III requires a flat RS-232C cable, we have also introduced an eight inch flat cable extender which will let you use the new longer cables with a Model III. The stock number of this item is 26-1497 ($17.95).

Speaking of extenders, 26-1495 ($29.95) is a Female to Female RS-232C adapter which will let you connect two RS-232C cables together.

The last new item is a null modem (26-1496 $29.95). A null modem lets two computers, equipped with RS-232C capabilities, communicate without the use of modems.

Here at the Microcomputer News, we are constantly connecting our Model IIs to Models I and III. The reason for connecting the computers is to transfer software and articles from one to another, using either a combination of Host and Terminal programs, or SCRIPSIT and a Terminal program. The null modem lets us do this very well.

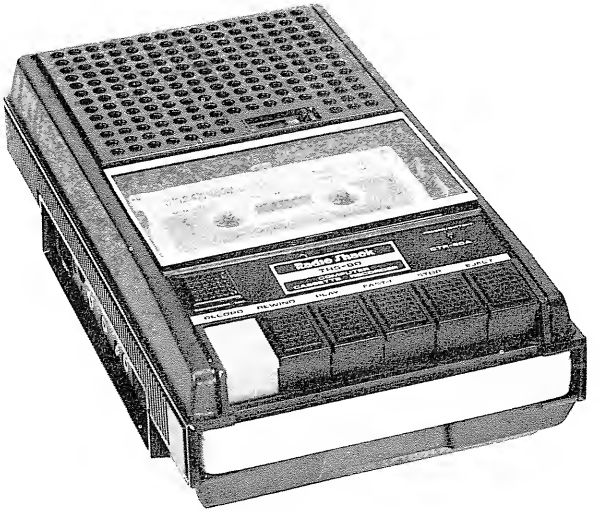
The following lines are available in the new Radio Shack RS-232-C cables and adapters.

Pin Numbers	Signals
1	Protective Ground
2	Transmit Data
3	Receive Data
4	Request to Send
5	Clear to Send
7	Signal Ground
8	Carrier Detect
15	I/O Transmit S.E.T.
17	Receiver Clock
20	Data Terminal Ready
24	Transmit Clock

CASSETTE PORT DEVICES

When we look at cassette port peripheral devices, we find four items: Cassette Recorders, Plug 'n Power™, the Direct Connect Modem I and the Digitizer.

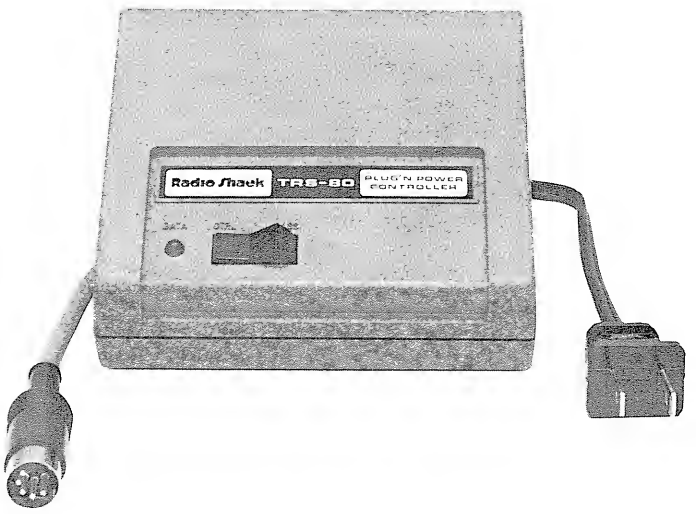
Both the Digitizer and the Direct Connect Modem I were built with special circuitry which allows owners of TRS-80 Model Is, who do not have the RS-232C serial interface, to enjoy the world of data communications. The special Cassette Software package (26-1139) and cable (26-3009) along with the Direct Connect Modem I give the Model I owner a useful package for communicating with data base systems such as CompuServe and Dow Jones.



CTR-80A Cassette Recorder

The Digitizer manual comes complete with a software routine which allows it to be used through the cassette port of a Model I.

The CTR-80A comes complete with the cable needed to connect to the cassette port of Model Is, IIIs, and Color Computers. One feature of the CTR-80A is the ability to Fast Forward or Rewind the cassette without the operator having to disconnect the motor control plug. If you already have a cassette recorder, cable 26-1207 will allow you to connect the recorder to a Model I, III or Color Computer.



TRS-80 Plug 'n Power Controller

To me, the Plug 'n Power controller is probably the most generally useful of the non-printer peripherals for TRS-80s. It can be used with Model Is, IIIs, and Color Computers to control electrical outlets, appliances, and lights throughout your home or business. I have one at home, and we use it to give the house that "occupied" look at all times. Our Color Computer is not always busy, especially if we are not home, and it easily manages the task of giving the house a lived in look without the fixed cycles of more conventional timers and other devices.

The TRS-80 Plug n' Power controller is the most versatile of the Plug 'n Power controllers since it is not limited to a single house code. By being able to access all sixteen of the house codes as well as the sixteen module codes within each house code, you can set each room of the house to a different house code (assuming no conflicts with the neighbors) and then control individual lights or appliances within that room. This gives you maximum flexibility in working out the different control programs you will want to use both while you are at home, and while the computer is home alone.

Peripheral Bugs, Errors and Fixes

LINE PRINTER VII (26-1167)

Forms for the Line Printer VII: The forms capacity specification for the LP VII given in both the LP VII Owner's Manual and the November, 1981 Microcomputer News is misleading. The LP VII will handle paper (single or multi-part) with no more than a total thickness of 6.8 mil., which usually means single part forms only. The LP VII will not feed generally available multi-part forms smoothly.

Revisions, Enhancements, Etc.

The following are the stock numbers for the Computer Peripheral miscellaneous items. These items can be ordered through your local Radio Shack store.

700-2110 Model I Tandygraph disk for 26-1191
Multi-pen Plotter N/C

700-2111 Model II Tandygraph disk for 26-1191
Multi-pen Plotter N/C

700-2112 Model III Tandygraph disk for 26-1191
Multi-pen Plotter N/C

700-2113 Color Computer Tandygraph disk for 26-1191
Multi-pen Plotter N/C

700-3010 Line Printer V (26-1165) Head
Cleaning Kit. $1.50

Wind-Chill Factor

W. C. Clough, Jr.
Education Director
Radio Shack Computer Center
Dallas, Texas

Just knowing the temperature during winter isn't enough, as the U. S. military discovered thirty years ago. Something is needed to reflect the effect of wind, which makes the human body lose heat in apparent proportion to the wind speed—in other words, the harder the wind blows, the colder it feels.

Hence the famous wind-chill factor. I know that April is a little late in the year for this information, but this is being written during one of the coldest Januaries in Texas so it seems appropriate at the moment.

Here is a program to supply the wind chill factor based on the current Fahrenheit temperature and the wind velocity in miles-per-hour. This version, written for the Model III, is easily translated to any machine using BASIC.

```
1Ø INPUT "TEMP (F): "; T
   : INPUT "WIND VELOCITY: "; V
   : IF V<4 THEN V=4
2Ø C=((1Ø.45 +(6.686112 *SQR(V)) -(.447Ø41 *V))
   /22.Ø34 *(T -91.4)) +91.4
3Ø PRINT USING "WINDCHILL ###.####"; C
```

In the formula, T represents Fahrenheit temperature, V the wind velocity in m.p.h., and C the wind chill factor.

Chill factors produced by wind velocities below four m.p.h. are negligible, but the formula produces erroneous answers with any velocity less than four m.p.h., therefore a conditional statement is used in line 10 to set V to four if necessary.

Similiar results are obtained with speeds above 45 m.p.h. For instance, zero degrees at 45 m.p.h. gives a -54 factor; at 60 m.p.h. the factor drops only one more degree.

Moving Dots

by William Barden, Jr.

Last month we showed you a SET/RESET subroutine that enabled us to set or reset any of the 2048 "pixels" that are present on the screen in the "low-resolution" graphics mode. This month we'll show you how SET/RESET may be used to program a "moving dot" for 16K Color Computer systems. The moving dot is exactly that—it moves at high speed in any of 16 directions and can be used to create graphics effects such as artillery projectiles or laser blasts. While we're looking at the moving dot code we'll explain in detail how we designed and implemented the program. This is a typical assembly language program—not too hard and not too easy.

THE SET/RESET SUBROUTINE

For those of you that are reading your first issue of this newsletter, let's review SET/RESET, covered last month.

SET/RESET performs the same function as SET/RESET in Color BASIC—it sets or resets one of 2048 pixels. The 2048 pixels are arranged in 64 columns by 32 rows, as shown in Figure 1. Each pixel is addressed by an x (column) and y (row) coordinate.

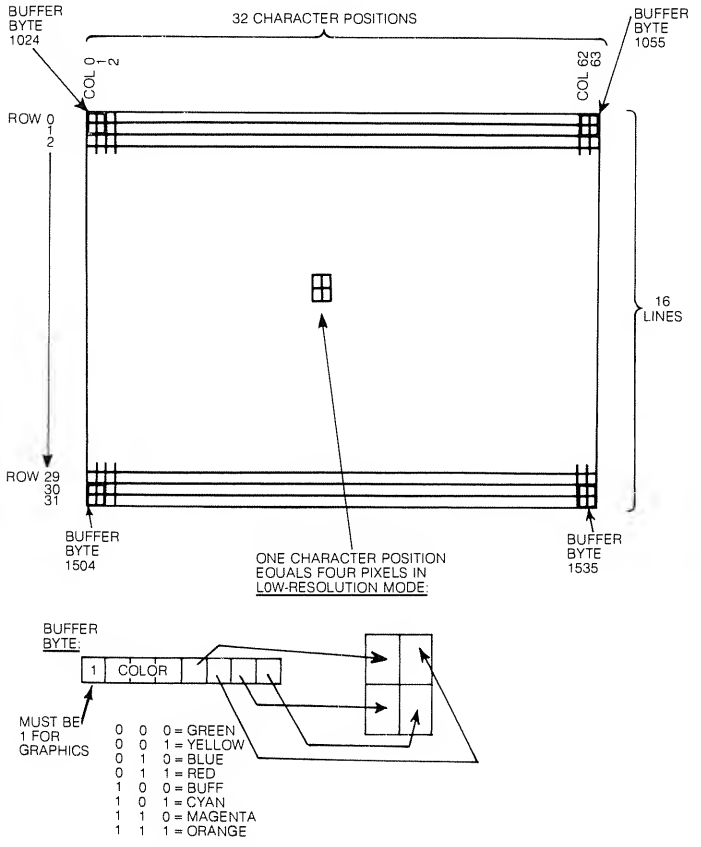


Figure 1. Color Computer Low-Resolution Graphics Mode

Why implement another way of doing SET/RESET when we have a perfectly good way in Color BASIC? I thought you'd never ask . . . First of all, it gives us some practice in typical 6809E assembly and machine language code. Secondly, it allows us to do some neat things without being bounded by BASIC commands.

The assembly language code for SET/RESET is shown in Listing 1. The code is identical to the code given last month with three minor differences. One call to $B4F4 and two calls to $B3ED have been deleted. These calls were to the "integer/floating" conversion routines in Color BASIC ROM. They are the standard way of "passing arguments" to assembly language code and are described in the Extended Color BASIC manual. The x and y values were passed to SET and RESET and a color code was passed back to BASIC by calls to these ROM subroutines. In this month's example we're going to use an alternative way to pass arguments. The third change is the addition of the MOVEDT routine, which we will talk about later.

Listing 1

```
3FØØ                ØØ1ØØ          ORG     $3FØØ
                    ØØ11Ø **************************************************
                    ØØ12Ø * MOVING DOT SUBROUTINE. MOVES ONE PIXEL IN ONE OF *
                    ØØ13Ø * 16 DIRECTIONS UNTIL BOUNDARY COLOR ENCOUNTERED   *
                    ØØ14Ø *     INPUT: $3FFØ=START X                         *
                    ØØ15Ø *            $3FF1=START Y                         *
                    ØØ16Ø *            $3FF2=DIRECTION CODE. Ø=Ø DEGREES,    *
                    ØØ17Ø *                 CLOCKWISE IN 22.5 DEGREE INCR    *
                    ØØ18Ø *            $3FF3, 4=DELAY COUNT                  *
                    ØØ19Ø *            $3FF5=RESERVED FOR COMPLETION CODE    *
                    ØØ2ØØ *     OUTPUT:$3FFØ=COMPLETION X                    *
                    ØØ21Ø *            $3FF1=COMPLETION Y                    *
                    ØØ22Ø *            $3FF5=COMPLETION COLOR CODE           *
                    ØØ23Ø **************************************************
3FØØ F6   3FF2      ØØ24Ø MOVEDT  LDB     $3FF2     GET DIRECTION CODE
3FØ3 58             ØØ25Ø         LSLB              TIMES 2
3FØ4 4F             ØØ26Ø         CLRA              NOW IN D
3FØ5 C3   3F3F      ØØ27Ø         ADDD    #INCTAB   POINT TO INCREMENT
3FØ8 1F   Ø1        ØØ28Ø         TFR     D,X       NOW IN X
3FØA 2Ø   1D        ØØ29Ø         BRA     MOVØ6Ø    BYPASS SET FIRST TIME
3FØC FC   3FFØ      ØØ3ØØ MOVØ4Ø  LDD     $3FFØ       GET CURRENT X,Y
3FØF 34   1Ø        ØØ31Ø         PSHS    X
3F11 8D   4C        ØØ32Ø         BSR     SET         SET POINT
3F13 35   1Ø        ØØ33Ø         PULS    X
3F15 5D             ØØ34Ø         TSTB                TEST COMPLETION
3F16 26   23        ØØ35Ø         BNE     MOVØ9Ø      GO IF BOUNDARY
3F18 1ØBE 3FF3      ØØ36Ø         LDY     $3FF3       GET DELAY COUNT
3F1C 31   3F        ØØ37Ø MOVØ5Ø  LEAY    -1,Y        DECREMENT COUNT
3F1E 26   FC        ØØ38Ø         BNE     MOVØ5Ø      LOOP
3F2Ø FC   3FFØ      ØØ39Ø         LDD     $3FFØ       GET CURRENT X,Y
3F23 34   1Ø        ØØ4ØØ         PSHS    X
3F25 8D   51        ØØ41Ø         BSR     RESET       RESET POINT
3F27 35   1Ø        ØØ42Ø         PULS    X
3F29 B6   3FFØ      ØØ43Ø MOVØ6Ø  LDA     $3FFØ       GET CURRENT X
3F2C AB   84        ØØ44Ø         ADDA    ,X          FIND NEXT X
3F2E B7   3FFØ      ØØ45Ø         STA     $3FFØ       STORE
3F31 B6   3FF1      ØØ46Ø         LDA     $3FF1       GET Y
3F34 AB   Ø1        ØØ47Ø         ADDA    1,X         FIND NEXT Y
3F36 B7   3FF1      ØØ48Ø         STA     $3FF1       STORE
3F39 2Ø   D1        ØØ49Ø         BRA     MOVØ4Ø      GOTO NEXT SET, RESET
3F3B F7   3FF5      ØØ5ØØ MOVØ9Ø  STB     $3FF5     STORE BOUNDARY COLOR
3F3E 39             ØØ51Ø         RTS               RETURN
3F3F      ØØFF      ØØ52Ø INCTAB  FDB     255       Ø DEGREES
3F41      Ø1FE      ØØ53Ø         FDB     256+254   22.5
3F43      Ø1FF      ØØ54Ø         FDB     256+255   45
3F45      Ø2FF      ØØ55Ø         FDB     512+255   67.5
3F47      Ø1ØØ      ØØ56Ø         FDB     256+Ø     9Ø
3F49      Ø2Ø1      ØØ57Ø         FDB     512+1     112.5
3F4B      Ø1Ø1      ØØ58Ø         FDB     256+1     135
3F4D      Ø1Ø2      ØØ59Ø         FDB     256+2     157.5
3F4F      ØØØ1      ØØ6ØØ         FDB     Ø+1       18Ø
```

```
3F51      FFØ2    ØØ61Ø          FDB     6528Ø+2  2Ø5.5
3F53      FFØ1    ØØ62Ø          FDB     6528Ø+1  225
3F55      FEØ1    ØØ63Ø          FDB     65Ø24+1  247.5
3F57      FFØØ    ØØ64Ø          FDB     6528Ø+Ø  27Ø
3F59      FEFF    ØØ65Ø          FDB     65Ø24+255   292.5
3F5B      FFFF    ØØ66Ø          FDB     6528Ø+255   315
3F5D      FFFE    ØØ67Ø          FDB     6528Ø+254   337.5
                  ØØ68Ø ****************************************************
                  ØØ69Ø * SET SUBROUTINE. SETS X,Y POINT IN LOW-RES MODE    *
                  ØØ7ØØ * CALLED FROM BASIC WITH X,Y IN ARGUMENT 8,8        *
                  ØØ71Ø ****************************************************
3F5F 8D   1F      ØØ72Ø SET       BSR     ADDMSK   FIND ADDRESS, MASK
3F61 1F   89      ØØ73Ø           TFR     A,B      SAVE MASK IN B
3F63 A4   84      ØØ74Ø           ANDA    ,X       TEST ALREADY SET
3F65 27   ØA      ØØ75Ø           BEQ     SETØ1Ø   GO IF NOT SET
3F67 E6   84      ØØ76Ø           LDB     ,X       SET, FIND COLOR
3F69 C4   7Ø      ØØ77Ø           ANDB    #$7Ø     MASK OUT COLOR
3F6B 54           ØØ78Ø           LSRB             ALIGN FOR 1-7 CODE
3F6C 54           ØØ79Ø           LSRB
3F6D 54           ØØ8ØØ           LSRB
3F6E 54           ØØ81Ø           LSRB
3F6F 2Ø   Ø5      ØØ82Ø           BRA     SETØ9Ø   RETURN
3F71 EA   84      ØØ83Ø SETØ1Ø    ORB     ,X       SET PIXEL
3F73 E7   84      ØØ84Ø           STB     ,X       RESTORE
3F75 5F           ØØ85Ø           CLRB             Ø FOR SET ACTION
3F76 4F           ØØ86Ø SETØ9Ø    CLRA             CLEAR A FOR CONVERT
3F77 39           ØØ87Ø           RTS              RETURN
                  ØØ88Ø ****************************************************
                  ØØ89Ø * RESET SUBROUTINE. RESETS ONE PIXEL IN LOW RES MODE*
                  ØØ9ØØ * CALLED FROM BASIC WITH X,Y IN ARGUMENT 8,8        *
                  ØØ91Ø ****************************************************
3F78 8D   Ø6      ØØ92Ø RESET     BSR     ADDMSK   FIND ADDRESS, MASK
3F7A 43           ØØ93Ø           COMA             FLIP MASK FOR RESET
3F7B A4   84      ØØ94Ø           ANDA    ,X       RESET PIXEL
3F7D A7   84      ØØ95Ø           STA     ,X       RESTORE BYTE
3F7F 39           ØØ96Ø           RTS              RETURN
                  ØØ97Ø ****************************************************
                  ØØ98Ø * FIND LOW-RES ADDRESS, MASK                        *
                  ØØ99Ø *      INPUT: A,B=X,Y                               *
                  Ø1ØØØ *      OUTPUT:X=BUFFER ADDRESS                      *
                  Ø1Ø1Ø *             A=MASK                                *
                  Ø1Ø2Ø ****************************************************
3F8Ø 34   Ø6      Ø1Ø3Ø ADDMSK    PSHS    D        SAVE X,Y
3F82 54           Ø1Ø4Ø           LSRB             FIND START OF LINE
3F83 86   2Ø      Ø1Ø5Ø           LDA     #32      32 IN A, Y IN B
3F85 3D           Ø1Ø6Ø           MUL              START OF LINE
3F86 C3   Ø4ØØ    Ø1Ø7Ø           ADDD    #$4ØØ    ADD START OF BUFFER
3F89 34   Ø6      Ø1Ø8Ø           PSHS    D        NOW ON STACK
3F8B E6   62      Ø1Ø9Ø           LDA     2,S      GET X
3F8D 4F           Ø11ØØ           CLRA             NOW IN D
3F8E 54           Ø111Ø           LSRB             X/2
3F8F E3   E1      Ø112Ø           ADDD    ,S++     BUFFER+LINE ST+X/2
3F91 1F   Ø1      Ø113Ø           TFR     D,X      NOW IN X
3F93 A6   E4      Ø114Ø           LDA     ,S       GET X
3F95 43           Ø115Ø           COMA             COMPLIMENT BIT
3F96 84   Ø1      Ø116Ø           ANDA    #1       FIND ODD/EVEN
3F98 4C           Ø117Ø           INCA             EVEN TO 1Ø, ODD TO Ø1
3F99 A7   E4      Ø118Ø           STA     ,S       SAVE
3F9B E6   61      Ø119Ø           LDB     1,S      GET Y
3F9D C4   Ø1      Ø12ØØ           ANDB    #1       GET ODD/EVEN
3F9F 26   Ø2      Ø121Ø           BNE     ADDØ9Ø   GO IF ODD (MASK=1Ø OR Ø1)
3FA1 48           Ø122Ø           LSLA             ALIGN (1ØØØ OR Ø1ØØ)
3FA2 48           Ø123Ø           LSLA
3FA3 32   62      Ø124Ø ADDØ9Ø    LEAS    2,S      RESET STACK
3FA5 39           Ø125Ø           RTS              RETURN
          ØØØØ    Ø126Ø           END
ØØØØØ TOTAL ERRORS
```

SET and RESET in this case will be "called" from the MOVEDT subroutine with the x and y values in the A and B registers, respectively. (If you're not familiar with the A and B registers, see the introductory column in this series two months previous, or review the introductory material in a good book on 6809 programming.)

SET sets the specified pixel by turning on one of the four bits in the byte associated with the "character position" containing the pixel. In this "low-resolution" graphics mode, each of the 512 character positions on the screen is set to graphics mode by turning on the most significant bit, and putting a "color code" of 0 through 7 into the next three bit positions, as shown in Figure 1.

Initially, the entire screen should be cleared by POKEs of 128 + color*16 from locations 1024 through 1535. This sets all character positions to graphics and stores a color code into each character position. The four pixels associated with each character position are turned off by being set to zero. Subsequent SETs will turn on a pixel by storing a one in one of the four bit positions and RESETs will turn off the pixel by storing a zero. The four pixels of each character position must all be the same color.

THE MOVING DOT WRITES AND HAVING WRIT . . .

Now that we have a SET/RESET subroutine, how can we implement a "moving dot" subroutine in assembly language? In theory, it's easy—just turn on a pixel, wait an interval, turn off the pixel and then turn on the next pixel, as shown in Figure 2. However, there are some problems that come to mind. Solving these problems constitutes a major part of any assembly language programming task. Coding is relatively easy once the problem is defined.

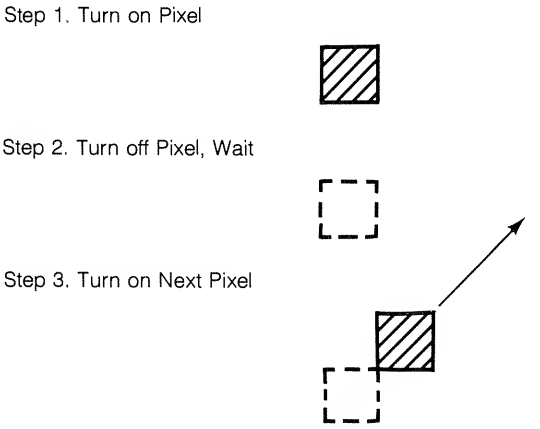


Figure 2. Moving Dot Action

The first obvious problem is that of figuring out where the next pixel is. Horizontal and vertical lines are easy—the next pixel is directly above, to the sides, or below. All we have to do in this case is to "bump" the x or y value by one or minus one to give the next position, and do the SET/RESET, as shown in Figure 3.

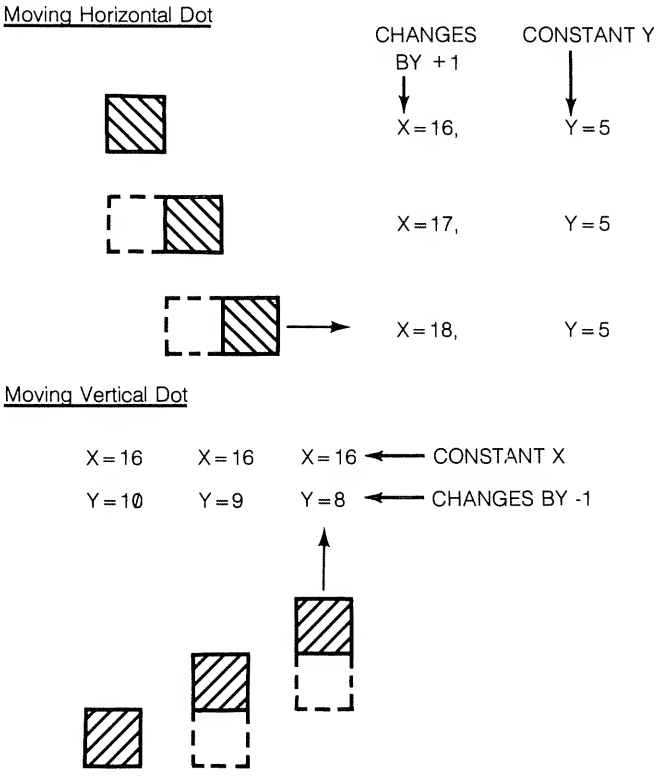


Figure 3. Moving Dot for Horizontal and Vertical Lines

Diagonal lines are also not too difficult. In this case we can bump both x and y to get the new position, as shown in Figure 4.

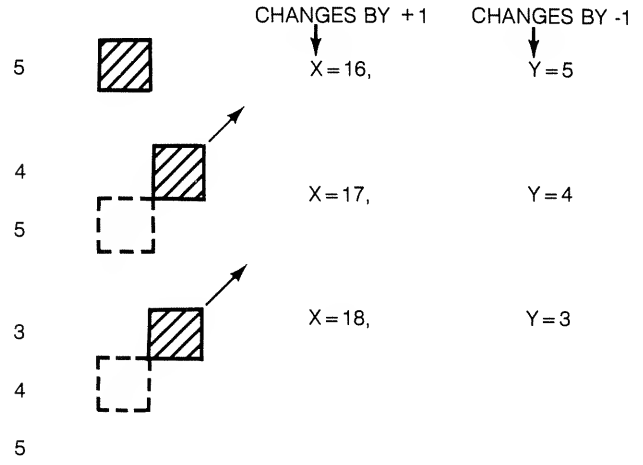


Figure 4. Moving Dot for Diagonal Lines

Horizontal, vertical, and diagonal lines, however, don't give us a great deal of flexibility. Ideally we'd like to be able to move a dot over any angle.

As a practical matter, however, we can't easily implement trigonometric functions such as SINE and COSINE in assembly language code. (To do so we'd need a major chunk of "floating-point" subroutine code, allowing us to work in numbers other than integers. We'll keep this subject for the April, 1989 issue.) As a compromise we'll allow only angles that are multiples of 22.5 degrees—22.5 degrees, 45 degrees, 67.5 degrees, and so forth. That will give us 16 angles, from 0 degrees (towards top) clockwise to 337.5 degrees, as shown in Figure 5.

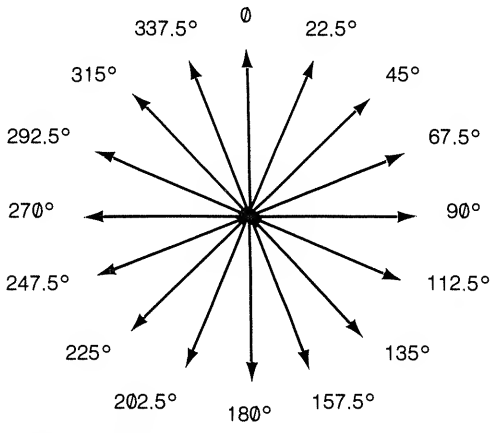


Figure 5. MOVEDT Angles

The angles that we haven't covered—22.5 degrees, 67.5 degrees, 112.5 degrees, and so forth, can be generated by setting and resetting a pixel, and by bumping the x and y values by 1 or 2, as shown in Table 1. The table gives the increments for moving a dot in any of 16 directions.

This table is held in the MOVEDT program as a 32-byte table and is the heart of the subroutine. The table is located at

Index	Degrees	X Increment	Y Increment
0	0	0	−1
1	22.5	1	−2
2	45	1	−1
3	67.5	2	−1
4	90	1	0
5	112.5	2	1
6	135	1	1
7	157.5	1	2
8	180	0	1
9	202.5	−1	2
10	225	−1	1
11	247.5	−2	1
12	270	−1	0
13	292.5	−2	−1
14	315	−1	−1
15	337.5	−1	−2

Table 1. Increment Table (INCTAB)

"INCTAB" (see Listing 1). There are 16 "entries" arranged to correspond to the angles of 0, 22.5, 45, 67.5 degrees, and so forth, up to 337.5 degrees. Each entry consists of an increment for x in the first byte, followed by an increment for y in the second byte.

Each increment byte is a "signed" value. The increment represents an 8-bit number of +1 (01), +2 (02), −1 (FF), or −2 (FE). We could have arranged the table as 32 bytes, each with a "FCB" or "Form Constant Byte" "pseudo-op." To save paper, however, we made each one a "Form Double Byte" or "FDB" pseudo-op. (Don't let the term "pseudo-op" throw you. It's anything other than an instruction operation code mnemonic. Pseudo-ops are used to tell the assembler to do things like setting the origin of the program, to generate tables such as INCTAB, or to END the assembly language statements.)

The FDB pseudo-ops generate two bytes of data for each operand. We've used a somewhat odd form for the operand to get the proper 8-bit values for x and y. 65024 (our value for x = −2) is really 11111110XXXXXXXX in binary, where XXXXXXXX is the y value. Likewise, 65280 represents a −1 in the x value, 256 a +1 in the x value, and 512 a +2 in the x value. Values of 255 and 254 are really −1 and −2 for y. If you're confused about this, look at the hexadecimal values in the third column. A value of 01FE, for example, represents an x increment of +1 and a y increment of −2.

Two other problems that we must resolve before coding are these: Where should the dot start and how far should it travel?

Answering the first problem is easy—it'll start where we tell it to start by an x and y coordinate. The x,y coordinate will be passed to the assembly language code as an "argument".

The second question could be handled by several options. We could specify a length of travel and count pixels. However, let's make the assumption that the MOVEDT subroutine will be used for "zapping" things in games. In this case it would be nice to have the dot stop when it encountered a target or boundary. Fortunately for us, the SET subroutine returns a color code if the pixel is already set, and we can use this feature to detect a target or boundary.

At this point we've blocked out how the MOVEDT should work: We'll call it from BASIC with a starting x,y and direction. MOVEDT will then move the dot along the specified angle until a target or boundary is encountered. Is there anything we've forgotten?

One thing could be added. We might put in a parameter to vary the delay between resetting the old dot and writing a new dot. The speed of a ping-pong ball is quite different from a tank shell, and this parameter would allow us to simulate both.

The final parameters that are passed between BASIC and MOVEDT are shown in Figure 6. They are located near the top of 16K memory in the $3F00 area. (The "$" stands for "hexadecimal number following".)

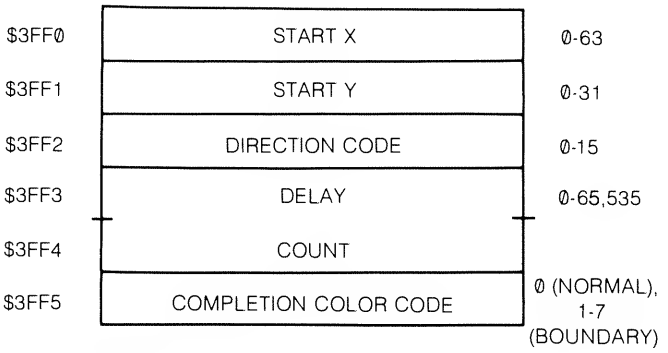


Figure 6. MOVEDT Parameters

The x parameter may be 0 through 63 and can be held in one byte at $3FF0. The y parameter may be 0 through 31 and is held in one byte at $3FF1. The direction code is a value from 0 through 15 and is held in $3FF2. The delay count is a 16-bit value of 0 through 65,535 and is held in two bytes at $3FF3 and $3FF4. The greater the value, the longer the delay. Location $3FF5 is reserved for the color code when the target or boundary is encountered. This color code is passed back as a value of 0 through 7. The code is one less than the Color BASIC color code values.

OPERATION OF MOVEDT

Now that we've solved some of the basic design problems, we can list the steps in MOVEDT. In larger programs we might do this as a "flowchart".

The basic operation of MOVEDT is this:

1. Use the direction code to find the increment from the INCTAB.
2. Call SET to set the next point. Test the code returned. If it is 0, the pixel was set. If it is non-zero, the pixel was in a target or boundary. In this case, return to BASIC with the color code.
3. Use the delay count to "waste time".
4. Reset the point.
5. Add the x,y increment from INCTAB to adjust the old point location to the new point location.
6. Go back to step 2.

DOWN TO THE NITTY GRITTY CODE

Let's see how these steps are done in MOVEDT.

First of all, the direction code is loaded into the B register from location $3FF2. Now, the B register is shifted left one bit position by a "Logical Shift Left." This multiplies the direction code by 2, as each INCTAB entry is 2 bytes long. The A register is now cleared by CLRA. At this point we've got twice the direction code in A and B. A and B taken together represent the D register.

The ADDD instruction adds the contents of D to the immediate value of INCTAB. The immediate value is held in the instruction itself ($3F3F) and represents the location of "INCTAB" (see INCTAB location). The result (in D) is the actual location of the INCTAB entry for the increment values. A TFR transfers the location from D to the X index register. This location "pointer" will remain in X throughout the remainder of MOVEDT.

The code from MOV040 to one instruction before MOV090 is the "main loop" of MOVEDT.

The current x,y value is loaded into the D register at MOV040. The current value of x,y is always located at locations $3FF0 and $3FF1; these locations are used as "working storage." Now a call to SET is done. Before the call, however, a PSHS X is done. This saves the contents of X (INCTAB location) in the hardware stack. This action is necessary as SET uses the X register. After the BSR to SET, the X register is restored by a PULS X.

The PSHS and PULS used the "stack area" in RAM. The 6809E uses two stacks, a "hardware" stack, designated by S, and a "user" stack, designated by U. The S stack is used to automatically store return addresses after a BSR (or LBSR or JSR) or for temporary storage of any registers by a PSHS. The U stack may be used by the programmer for any purpose. In this case we've only used the S stack. The S register points to the stack area. As the BASIC interpreter also uses the S stack, the S register points to a valid stack area on entry to MOVEDT. As a matter of fact we must use (or at least restore) the S register so that the final "Return from Subroutine" instruction properly returns to the BASIC interpreter.

After the call to SET, the B register contains a code of 0 or 1 through 7. If the code is 0, the SET operated without a hitch. If the code is 1 through 7, the pixel to be set was already set, indicating a target or boundary. The TSTB tests B and if the contents of B are not equal to zero (BNE), a return to BASIC is made at MOV090 after first storing the target or boundary color code in $3FF5.

Next (MOV050), the delay count is picked up from $3FF3 and put into the Y register. The delay count is a 16-bit value of 0 through 65,535. The LEAY -1,Y instruction takes the contents of Y, adds -1 to it, and puts the result back into Y. If Y is not equal to zero, a loop is made back to MOV050. When Y finally becomes zero, the LDD $3FF0 instruction is executed. Note that a value of 0 is the **longest** delay. This is true because the BNE is done **after** the decrement. At this point, the value in Y is 65,535 if it was originally 0.

The next four instructions repeat the load of x,y, the push of x, the call (to RESET), and the pull of x. The RESET resets the pixel just set before the delay.

The code at MOV060 is the code to increment x,y to find the next pixel. This is done as two 8-bit adds. If we did a 16-bit add here (via ADDD) we might get an erroneous result as a spurious carry occurred to the upper 8 bits in A. First, the INCTAB value for x is added to A. The result is stored back in $3FF0. Next, the INCTAB value for y is added to A. The result is stored back to $3FF1. Both of these adds used the X register in an "indexed addressing" mode where the second operand for the add was pointed to by the X index register.

The BRA (Branch Always) branches back to MOV040 for the next set, reset operation.

USING MOVEDT

To use MOVEDT, first CLEAR 200, &H3EFF. This protects the area in high memory that will be used for MOVEDT. Next, use the program shown in Listing 2 to relocate the machine language form of MOVEDT into the $3F00 area. Once this relocation is done, you won't need to repeat the operation.

Listing 2

```
10Ø DATA 246, 63, 242, 88, 79, 195, 63, 63
13Ø DATA 31, 1, 32, 29, 252, 63, 24Ø, 52
16Ø DATA 16, 141, 76, 53, 16, 93, 38, 35
19Ø DATA 16, 19Ø, 63, 243, 49, 63, 38, 252
22Ø DATA 252, 63, 24Ø, 52, 16, 141, 81, 53
25Ø DATA 16, 182, 63, 24Ø, 171, 132, 183, 63
28Ø DATA 24Ø, 182, 63, 241, 171, 1, 183, 63
31Ø DATA 241, 32, 2Ø9, 247, 63, 245, 57, Ø
34Ø DATA 255, 1, 254, 1, 255, 2, 255, 1
37Ø DATA Ø, 2, 1, 1, 1, 1, 2, Ø
4ØØ DATA 1, 255, 2, 255, 1, 254, 1, 255
43Ø DATA Ø, 254, 255, 255, 255, 255, 254, 141
46Ø DATA 31, 31, 137, 164, 132, 39, 1Ø, 23Ø
49Ø DATA 132, 196, 112, 84, 84, 84, 84, 32
52Ø DATA 5, 234, 132, 231, 132, 95, 79, 57
55Ø DATA 141, 6, 67, 164, 132, 167, 132, 57
58Ø DATA 52, 6, 84, 134, 32, 61, 195, 4
61Ø DATA Ø, 52, 6, 23Ø, 98, 79, 84, 227
64Ø DATA 225, 31, 1, 166, 228, 67, 132, 1
67Ø DATA 76, 167, 228, 23Ø, 97, 196, 1, 38
7ØØ DATA 2, 72, 72, 5Ø, 98, 57
73Ø FOR I=16128 TO 16293
76Ø READ A
     : POKE I, A
79Ø NEXT I
```

You're now set to "interface" from your BASIC program to MOVEDT. MOVEDT is designed to operate with a "black" screen for any unused areas. Boundaries and targets may be any color except green (a 0 color code conflicts with a normal return from MOVETB).

Before using MOVETB, clear the entire screen by doing POKEs of locations 1024 through 1535. Use the following code for the POKEs: 128+c*16. The 128 sets each character position byte to "graphics" and the c*16 stores a color code of 1 through 7 (yellow, blue, red, buff, cyan, magenta, orange).

Draw a boundary of a color that will not be used for targets. The boundary will terminate any line of moving dots if they do not hit a target.

Listing 3 shows a demonstration program for MOVEDT. Line numbers 850 through 910 clear the screen and set each character position byte to code 7, or orange (128+7*16=240).

Listing 3

```
10Ø DATA 246, 63, 242, 88, 79, 195, 63, 63
13Ø DATA 31, 1, 32, 29, 252, 63, 24Ø, 52
16Ø DATA 16, 141, 76, 53, 16, 93, 38, 35
19Ø DATA 16, 19Ø, 63, 243, 49, 63, 38, 252
22Ø DATA 252, 63, 24Ø, 52, 16, 141, 81, 53
25Ø DATA 16, 182, 63, 24Ø, 171, 132, 183, 63
28Ø DATA 24Ø, 182, 63, 241, 171, 1, 183, 63
31Ø DATA 241, 32, 2Ø9, 247, 63, 245, 57, Ø
34Ø DATA 255, 1, 254, 1, 255, 2, 255, 1
37Ø DATA Ø, 2, 1, 1, 1, 1, 2, Ø
4ØØ DATA 1, 255, 2, 255, 1, 254, 1, 255
43Ø DATA Ø, 254, 255, 255, 255, 255, 254, 141
46Ø DATA 31, 31, 137, 164, 132, 39, 1Ø, 23Ø
49Ø DATA 132, 196, 112, 84, 84, 84, 84, 32
52Ø DATA 5, 234, 132, 231, 132, 95, 79, 57
55Ø DATA 141, 6, 67, 164, 132, 167, 132, 57
58Ø DATA 52, 6, 84, 134, 32, 61, 195, 4
61Ø DATA Ø, 52, 6, 23Ø, 98, 79, 84, 227
64Ø DATA 225, 31, 1, 166, 228, 67, 132, 1
67Ø DATA 76, 167, 228, 23Ø, 97, 196, 1, 38
7ØØ DATA 2, 72, 72, 5Ø, 98, 57
73Ø FOR I=16128 TO 16293
76Ø READ A
     : POKE I, A
79Ø NEXT I
82Ø DEFUSRØ=&H3FØØ 'POKE 275, 63 POKE 276, Ø FOR
     COLOR BASIC
85Ø FOR I=1Ø24 TO 1Ø24+511
88Ø POKE I, 24Ø
91Ø NEXT I
94Ø FOR I=Ø TO 31
97Ø POKE 1Ø24+I, 255
1ØØØ POKE 15Ø4+I, 255
1Ø3Ø NEXT I
1Ø6Ø FOR I=1 TO 14
1Ø9Ø POKE 1Ø24+I*32, 255
112Ø POKE 1Ø24+31+I*32, 255
115Ø NEXT I
116Ø T=1ØØØØ
118Ø D=RND(16)
     : IFD=16 THEN D=Ø
121Ø POKE 16368, 32
     : POKE 16369, 16
124Ø POKE 16371, INT(T/256)
     : POKE 16372, Ø
127Ø POKE 1637Ø, D
13ØØ A=USRØ(Ø)  ' USR(Ø) FOR COLOR BASIC
133Ø GOTO 118Ø
```

Lines 940 through 1030 draw the top and bottom boundary lines. Lines 1060 through 1150 draw the side boundary lines. The values used in the POKEs are 240 for the graphics bit and orange, plus 15 to turn all pixels on.

The time delay value used is INT(10000/256). This is POKEd into location &H3FF3, while a zero is POKEd into location &H3FF4.

The starting x,y is 32,16, approximately the middle of the screen. These values are POKEd into locations $3FF0 and $3FF1.

The direction is generated by D = RND(16). A value of 16 is converted to 0, so that the direction code is 0 through 15. D is POKEd into location &H3FF2.

The USR0 call calls MOVEDT and returns after the dot has encountered the boundary. A GOTO 1180 generates random lines of moving dots that emanate from the center of the screen outward to the boundary.

Change T to observe the effects of different time delays.

NO WONDER GAME PROGRAMMERS MAKE SO MUCH MONEY!

This is a simple example of what can be done to implement some special graphics features by assembly language. What we've created certainly isn't a complete games package, but it might show you how assembly language subroutines might be strung together to create the high-speed effects found in many games. Some excellent high-speed games can be designed with a dozen or so "modules" as we've considered here. In future columns we'll look at additional techniques for graphics, and maybe you, too, can MAKE BIG MONEY! in computer games . . .

Next month we'll look at some additional assembly language topics. In the meantime, I'd recommend getting the Editor/Assembler for the Color Computer if you don't already have it. It is possible to do hand assembly of machine language programs for the 6809, but it's very tedious. It's best to save your energy for solving those design problems and for debugging the code!

SCRIPSIT™ Ideas

This is the third article in a row written by the Model I/III Software Support Group. We hope you are not getting tired of hearing from us. If you are, perhaps it will be some comfort to you to know that we are not scheduled to write another one until September. If I had been allowed to use SCRIPSIT while a freshman in college, the composition would not have been any easier, but at least the typing of the papers would have been eased considerably. Speaking of SCRIPSIT, that is the program that will be featured this month. (How's that for transition?)

SCRIPSIT is one of our most popular programs, as perhaps you've found if you tried to order it early last year. We definitely had a hard time keeping up with the demand for it. After receiving my own copy and using it for several months, I have become an enthusiastic user. As you must expect, I am using SCRIPSIT to write and edit this article. Sometimes we hear about people using SCRIPSIT to do things that it wasn't originally intended to do, and sometimes it does them well, and other times, it doesn't do them at all. It is this second group that we wish we could help, but there are a few limitations.

We would like to share with you some of the things that we have found to be easier with SCRIPSIT. But no matter how hard you try to read the manual and listen to the training tapes, if you don't jump in with both feet, you'll probably never use the program to its fullest potential. I suggest trying out various combinations to see what can be done. As an example, recently I have been working on the writing of a play (perhaps skit would better describe it) with a group of friends. When they found out that I had access to a computer and Word Processing program, guess whose job it became to type and revise it. Fortunately, we only get together once a week, so I didn't have to reprint it on a daily basis. I don't think it takes much imagination to see that it's easier to make only corrections and reprint than it is to re-type an entire play (about 20 pages) every week.

While working on the play, I wanted to have the character's name on the left, and all text indented. Naturally, though, the player's lines were longer than the document lines, and I got the automatic "wrap-around," which went back to the left margin. After finishing the typing of the text, I went back through to edit it for a pleasant visual effect. The procedure I used was to place the cursor on the first character at the left margin, type ⟨**CTRL**⟩⟨**S**⟩⟨**CTRL**⟩⟨**X**⟩ to insert a line, ⟨**CTRL**⟩⟨**TAB**⟩ to tab the cursor to the position I wanted, followed by ⟨**CLEAR**⟩ to bring the text back to the cursor. I might point out that if the indentation is very large, it may take more than one time to move it all the way over. The first time will move the spaces on the right side over to the margin, and subsequent repetitions will move one word at a time down to the next line. With practice, you will get so fast that you will think you've been doing it for years. (Note: This procedure should work for outlines, also. One other precaution - make sure that the video width matches the printer margins, otherwise the spaces will come in the strangest places! So now you want to know how to make the video width change? Use ⟨**Break**⟩ W = n where n is the desired number of characters per line.)

During the Thanksgiving Holidays, I took a computer with me to my parents' home. After all our guests had left, my mother asked me if the computer would store and print recipes. I decided to try it, and it works for that, too.

We began by typing in the recipe just as we wanted it to appear, but we did not include any format information, and we ended each recipe with a page boundary marker (make sure to use ⟨**CLEAR**⟩ after the page marker, before saving). After saving several recipes, we exited and went to BASIC. Since I had a Line Printer VIII with me, we sent an LPRINT CHR$(27);CHR$(56) to the printer to cause it to print eight lines to the inch instead of the usual 6, and then sent LPRINT CHR$(27);CHR$(20) to select the condensed (16.7 char/in) print mode. (If you're using a Line Printer V, the commands are slightly different. Use LPRINT CHR$(27);CHR$(14) to set condensed print. For other printers, check your manual to see if condensed print and line feeds are possible, and how to set them.) We then went back into SCRIPSIT and created a "Format Document" which included the following format line:

)TM = 3 BM = 22 PL = 24 LM = 5 RM = 78

The only two items which are worth mentioning here are the Page Length of 24 and the Right Margin of 78. These correspond to the size of a 3x5 index card (with the printer set as previously defined). We then "Chain Loaded" several recipes together and printed out the recipes, then cut the paper to 3x5 and placed them into some clear plastic recipe sleeves.

Another concern, at times, is making the name of the document (in this instance, a recipe) conform to TRSDOS filename requirements. (If you're using tape, this won't be a problem at all. Just label the cassette.) We had fun trying to think of a descriptive, one-word name with not more than eight letters. Some examples: Green Bean Casserole became GRBEAN and Pumpkin Ice-Box Pie became PUMIBPIE. (Please, don't call us to ask for these recipes, they are standard recipes, nothing special.)

If you have come up with an interesting use for SCRIPSIT, one that you feel would be of interest to other readers, we would like to hear from you. If we hear of enough interesting uses to warrant it, we will use them in a future article.

Computer Customer Services Address and Phone Numbers

8AM to 5PM Central Time

Computer Customer Services
400 Atrium, One Tandy Center
Fort Worth, Texas 76102

Model I/III Business Software
Outside Texas 1-800-433-5641
In Texas 1-800-772-5973

Model II Business Software
Outside Texas 1-800-433-5640
In Texas 1-800-772-5972

Education Software
Outside Texas 1-800-433-1679
In Texas 1-800-772-5914

All Other Calls Related to Computers
Outside Texas 1-800-433-1679
In Texas 1-800-772-5914

Switchboard—1-817-390-3583

Notes From Computer Customer Services

Computer Customer Services recently supplied us with the following Color Computer Routines which they thought you might be interested in. Please test these programs carefully in your computer and with your programs. These routines are not "official" Radio Shack programs. Disclaimer: Radio Shack does not support the use of these programs. Use of any of these programs is left strictly to the user's discretion and Radio Shack is not responsible for any results they may produce.

COLOR COMPUTER TOP-OF-FORM

```
10Ø '*************************
     *    COLOR COMPUTER     *
     *     TOP OF FORMS      *
     *        DRIVER         *
     *     ( 12 = TOF )      *
     *************************
11Ø '*******************************************
     * 1) PROTECT MEMORY                       *
     * 2) ENTER AND RUN PROGRAM AS WRITTEN     *
     * 3) TYPE <N><E><W> <ENTER>               *
     * 4) THE START ADDRESS PLUS 32 IS THE LINE*
12Ø '*    COUNTER. TO CLEAR THE LINE COUNTER    *
     *    POKE THAT ADDRESS WITH A 255. EX:     *
     *    IF YOU LOADED THE DRIVER AT 1ØØØØ     *
13Ø '*    THEN TO CLEAR THE LINE COUNTER YOU    *
     *    WOULD EXECUTE THE FOLLOWING:          *
     *      POKE 1ØØ32, 255                     *
     * 5) THE START ADDRESS PLUS 56 CONTROLS    *
14Ø '*    THE NUMBER OF LINES TO BE PRINTED PER*
     *    PAGE.                                 *
     * 6) THE START ADDRESS PLUS 73 CONTROLS    *
     *    THE PAGE LENGTH.                      *
     * 7) DEFAULT VALUES:                       *
15Ø '*      LINES TO BE PRINTED PER PAGE = 6Ø    *
     *      LINES PER PAGE = 66                 *
     *******************************************
16Ø CLS
17Ø INPUT "START ADDRESS"; START
18Ø FOR ADDRESS = START TO START + 116
19Ø READ CODE
2ØØ POKE ADDRESS, CODE
21Ø NEXT ADDRESS
22Ø DEFUSRØ = START
23Ø A = USRØ(Ø)
24Ø END
25Ø DATA  Ø52, Ø18, 182, ØØ1, 1Ø3, 19Ø, ØØ1, 1Ø4,
     167, 141, ØØØ, 1Ø2, 175, 141, ØØØ, Ø99, 134,
     126, Ø48, 141, ØØØ, Ø11, 183, ØØ1, 1Ø3, 191,
     ØØ1, 1Ø4
26Ø DATA  Ø53, 146, Ø18, Ø18, 255, Ø52, Ø22, 198,
     254, 2Ø9, 111, Ø38, Ø6Ø, 129, Ø12, Ø39, Ø14,
     Ø13, 156, Ø38, Ø52, 1Ø8, 14Ø, 236, 23Ø, 14Ø,
     233, 193
27Ø DATA  Ø6Ø, Ø37, Ø42, 19Ø, ØØ1, 1Ø4, 175, 14Ø,
     221, Ø48, 141, ØØØ, Ø45, 191, ØØ1, 1Ø4, 198,
     Ø66, 224, 14Ø, 211, 231, 14Ø, 2Ø8, 134, Ø13,
     198, 254
28Ø DATA  215, 111, 173, 159, 16Ø, ØØ2, 1Ø6, 14Ø,
     195, Ø38, 241, Ø48, 14Ø, 188, 191, ØØ1, 1Ø4,
     Ø53, Ø22, 129, Ø12, Ø38, ØØ7, 134, ØØ8, 173,
     159, 16Ø
29Ø DATA  ØØ2, Ø79, Ø18, Ø18, Ø18


1ØØ '*****************************************
     1) ENTER AND RUN THE PROGRAM AS WRITTEN
     2) TYPE <N><E><W><ENTER>
     3) ADDRESS 1Ø13 CONTROLS SPEED
        (Ø=NORMAL, 255=SLOW)
     *****************************************
2ØØ DATA  Ø52, Ø16, 142, ØØØ, ØØ1, Ø48, Ø31, Ø38,
     252, Ø53, Ø16
21Ø FOR X=1Ø1Ø TO 1Ø2Ø
22Ø READ A
23Ø POKE X, A
24Ø NEXT X
25Ø POKE 1Ø21, PEEK(359)
26Ø POKE 1Ø22, PEEK(36Ø)
27Ø POKE 1Ø23, PEEK(361)
28Ø POKE 359, 126
29Ø POKE 36Ø, ØØ3
3ØØ POKE 361, 242
```

CAUTION: I/O functions, including Keyboard input and Tape saves and loads may not function with this routine. Test this routine carefully before using it!

COLOR COMPUTER DIRECTORY TO PRINTER

```
1ØØ '* THIS PROGRAM PUTS THE DRIVE Ø DIRECTORY
     OUT TO THE PRINTER
11Ø CLS
12Ø INPUT "DISK NAME"; N$
13Ø PRINT #-2, N$
14Ø PRINT #-2
15Ø CLEAR 2ØØØ
16Ø T=17
     : S=3
17Ø DSKI$ Ø, T, S, A$, B$
18Ø FOR X=1 TO 1ØØ STEP 32
19Ø FOR Y=Ø TO 12
2ØØ C$=MID$(A$, X+Y, 1)
21Ø IF C$=CHR$(255) AND Y=Ø THEN FOR L=1 TO 4
     : PRINT #-2
     : NEXT L
     : END
22Ø IF Y=Ø AND C$=CHR$(Ø) THEN 33Ø
23Ø IF Y=8 THEN PRINT #-2, " ";
24Ø IF Y<11 THEN PRINT #-2, C$;
25Ø IF Y<>11 THEN 3ØØ
26Ø IF C$=CHR$(Ø) THEN PRINT #-2, "  BASIC ";
     : GOTO 3ØØ
27Ø IF C$=CHR$(1) THEN PRINT #-2, "  DATA  ";
     : GOTO 3ØØ
28Ø IF C$=CHR$(2) THEN PRINT #-2, "  OBJECT";
     : GOTO 3ØØ
29Ø PRINT #-2, "  SOURCE";
3ØØ IF Y<>12 THEN 32Ø
```

(Continued on Page 18)

Network Expansion

How TRS-80 Owners Will Benefit

Editor's Note: The CompuServe Information Service is one of the largest information and entertainment services available to owners of personal computers and computer terminals. With each issue of TRS-80 Microcomputer NEWS, various features of CompuServe will be discussed. The CompuServe Information Service is sold at Radio Shack stores nationwide and in Canada.

CompuServe Incorporated has given birth to a third major business division which will allow the CompuServe Information Service (CIS) to be accessed in an ever increasing number of U.S. cities.

CompuServe now offers the communications services of its value-added network.

The CompuServe telecommunications network will be available for the first time to commercial customers not using the company's computers in a time sharing arrangement.

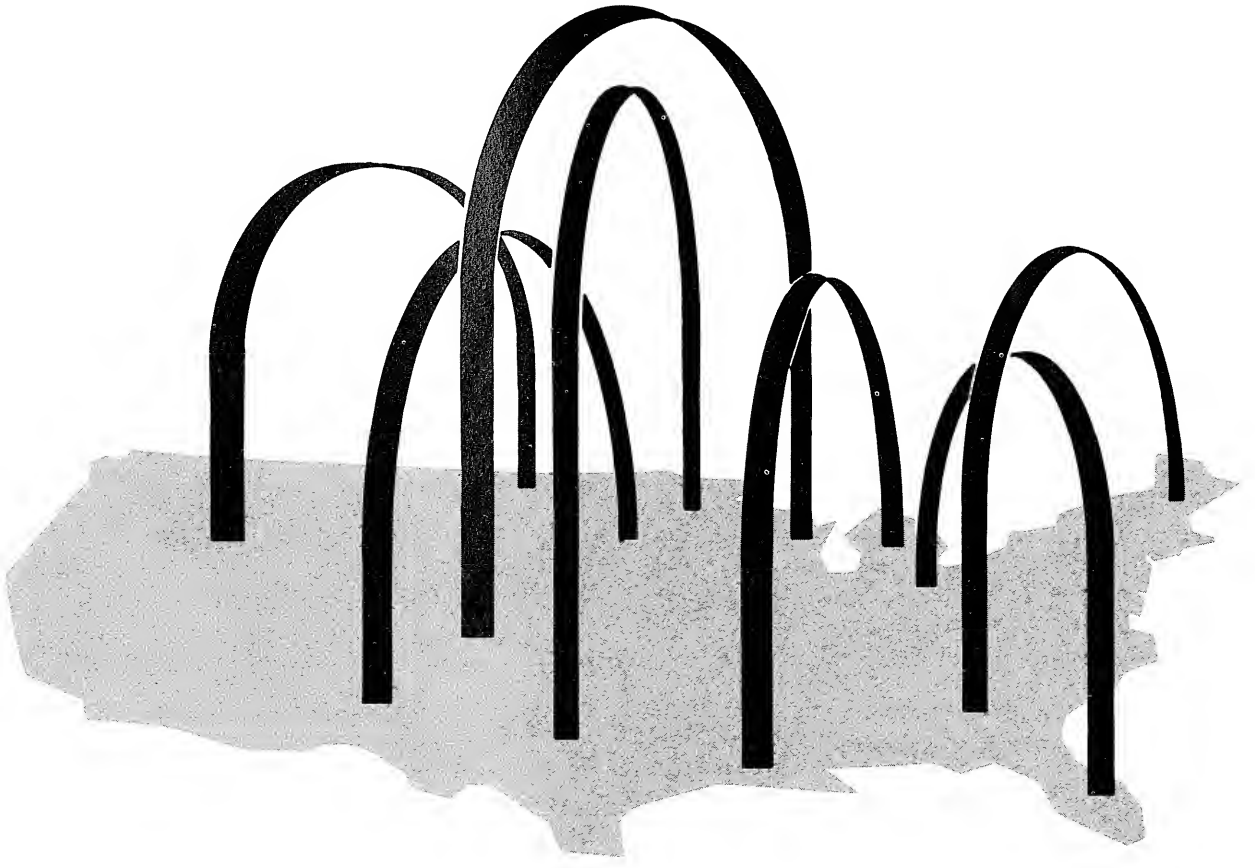
As the network reaches new cities, CompuServe Information Service customers can dial directly into the service, saving surcharges associated with alternate access through a supplementary network.

The CompuServe network has already expanded to more than 60 U.S. cities. Plans call for the network to reach 120 cities by April 1982 and 300 cities by the end of 1983.

That expansion will greatly reduce the number of CompuServe Information Service customers who now must dial in through a TYMNET network telephone number. TYMNET is the common carrier telecommunications network used as a "back up" or supplementary network to the CompuServe network. CIS customers who dial in through the CompuServe network save the $2 an hour communication surcharge associated with dialing in through a TYMNET telephone number.

CIS customers consistently tell the customer service department that access through a CompuServe number is more reliable than through supplementary network numbers.

The reliability stems from the years of development and technological innovation which has gone into the CompuServe telecommunications network. CompuServe began building the network in 1972 to link its many commercial customers to its computers in Columbus, Ohio. Today, more than 600 commercial customers use the network to



access CompuServe's computers and the many value-added software programs available. CompuServe's commercial customers include one-fifth of the Fortune 500 companies, large financial institutions, mining companies and government agencies.

In addition to years of networking experience, the CompuServe network's reliability also comes as a part of the physical construction of the network. It has progressed from direct lines to multiplexers to packet technology to the current highly effective and efficient virtual circuit network.

One of the unique aspects of the CompuServe network is enjoyed by CIS customers who utilize our home banking service.

United American Bank customers access CIS and are switched to the bank's computers in Knoxville, Tenn. by the CompuServe network. The switching activity is transparent to the banking customer and allows the customer to conduct banking activities within the security of the bank's own system. The network switches the customer back to the CompuServe Information Service when he is finished.

CompuServe's network consists of many small to medium scale computer systems, strategically located across the country, which communicate data over leased lines and satellite circuits. These MicroNode computers, designed, built and maintained by CompuServe's own data communications staff, communicate with each other and with other host computer systems.

The CompuServe network's dynamic block size assures maximum throughput on transmission lines of varying quality, and, unlike other networks that depend on centralized control processes, the network's distributed intelligence guards the network against any large geographic outages.

The CompuServe network's interconnection "ring" configuration provides reliable computer access from remote locations in a truly effective and efficient manner. The benefit gained from this flexible configuration, combined with intelligent alternate routing, is the most dependable service in the industry.

Each MicroNode in the CompuServe network has its own Uninterruptible Power Supply system to ensure continued operation. The MicroNodes are also equipped with diagnostic control microprocessors and separate maintenance circuits. All MicroNodes feature multiple paths into the network, error detection and retransmission software and downline software updating. The CompuServe network also maintains alternate routes.

All this adds up to a documented reliability rating of between 99.6 and 99.8 percent for "uptime" on the CompuServe system. CompuServe's computer technology and advanced networking knowledge together have achieved that remarkable statistic.

CIS customers should read the telephone number update section of the monthly Update newsletter to find out when CompuServe access has reached your city. Current telephone access information is also available through CompuServe User Information under "CIS Telephone Access Numbers," or type Go CIS-174.

Questions and comments about the CompuServe Information Service can be sent to Richard A. Baker, editorial director, CompuServe Information Service, 5000 Arlington Centre Blvd., P.O. Box 20212, Columbus, Ohio 43220 or through Feedback, main menu item 5, CompuServe User Information.

Model I Head Cleaner Program, Version 2

Lowell Johnson
JOHNSON CAR WASH COMPANY
106 Belleville Court
Thief River Falls, MN 56701

Although the idea of your head cleaning diskettes is very good, I questioned using the "DIR" command to operate the disk drive. To operate the recommended 30 seconds it is necessary to "unlock" the computer with the reset button and repeat the procedure described in the instructions. Also, the head will travel to track 17 and remain there, using only a small part of the cleaning diskette's surface.

The enclosed program will step the head of the selected drive from track 0 to 34 and back, and will operate the drive for approximately 30 seconds. It will operate only on the Model I, as I could find no source for the disk controller addresses on the Model III.

```
1ØØØ 'SUBMITTED BY:  LOWELL JOHNSON
     THIEF RIVER FALLS  MN
1Ø1Ø CLS
1Ø2Ø PRINT @ 7, " DRIVER PROGRAM FOR HEAD
     CLEANING DISKETTES"
1Ø3Ø PRINT @ 137, "REMOVE PROGRAM DISKETTES FROM
     ALL DRIVES"
1Ø4Ø DR$=" "
1Ø5Ø DN=Ø
1Ø6Ø PRINT @ 393,;
1Ø7Ø INPUT "DRIVE NUMBER (Ø-3) OR <ENTER> TO
     QUIT"; DR$
1Ø8Ø IF DR$=" " THEN CLS
     : END
1Ø9Ø IF VAL(DR$)>3 THEN 1Ø6Ø
11ØØ DR=2 [ VAL(DR$)
111Ø PRINT @ 595, "HEAD IN POSITION ";
112Ø F=Ø
113Ø L=34
114Ø S=1
115Ø GOSUB 122Ø
116Ø IF DN=1 THEN 1Ø1Ø
117Ø F=34
118Ø L=Ø
119Ø S=-1
12ØØ GOSUB 122Ø
121Ø GOTO 1Ø1Ø
122Ø FOR X=F TO L STEP S
123Ø PRINT @ 612, X
124Ø POKE &H37EØ, DR
125Ø POKE &H37EF, X
126Ø POKE &H37EC, 18
127Ø IF PEEK(&H37EC)<2 THEN 132Ø
128Ø FOR Y=1 TO 11Ø
129Ø NEXT Y
13ØØ NEXT X
131Ø RETURN
132Ø PRINT @ 785, "DEVICE NOT AVAILABLE !!";
133Ø DN=1
134Ø FOR Y=1 TO 29ØØ
135Ø NEXT
136Ø RETURN
```

Dow Jones Sports Data Base

And for you sports fans,
Let's go to the video display!
Maybe you'd like to know . . .

- Who's leading the National League?
- What was the final score of the Ohio State-Michigan Game?
- How many points did "Magic Johnson" score last night?
- Who played the Celtics on Sunday?
- How many strokes under par is Nicklaus?
- Who won the U.S. Open? . . . the Indy 500? . . . the Kentucky Derby? . . . Wimbledon?

Find out fast . . . with just the touch of a few buttons!

If you are looking for immediate access to what's happening in the world of sports, let Dow Jones save you time and keep you informed with the new Sports Report data base.

Learn About Your Favorite Sports, Teams and Players!

- Major League Baseball
- NFL Football
- NBA Basketball
- NHL Hockey
- PGA & LPGA Golf
- Soccer
- Tennis
- NCAA Football
- NCAA Basketball
- And More!

You simply select the sports category of your choice and retrieve the latest scores and statistics provided by United Press International over your Radio Shack computer. Whether it be the schedule of your favorite pro football team, the National League baseball standings or scores of Saturday's top college games—the information is at your fingertips. These statistics are updated every morning, Monday through Friday.

THE COST

The usage rate for the Sports Report data base is the same as our regular news data base. (See your Dow Jones price list for details.)

HOW TO GET THE SPORTS REPORT

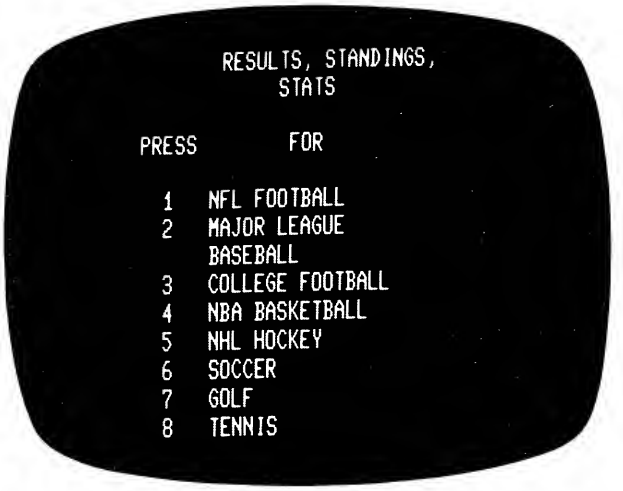
To enter the data base on the DOW JONES NEWS/RETRIEVAL® Service, simply type two slashes, SPORTS and press the ⟨ENTER⟩ key.

⟨/⟩⟨/⟩⟨S⟩⟨P⟩⟨O⟩⟨R⟩⟨T⟩⟨S⟩
⟨ENTER⟩

This is what you will see:

TOP MENU

Once in the data base, select the sports information you want from the menus (indices) as they appear on your screen or print-out.



SEASONAL SUB-MENU

For example, to view college football statistics, type:
3 ⟨ENTER⟩

NOTES

The following commands will assist you in moving about the data base:

1. To go forward to the next page within a section, simply press the ⟨ENTER⟩ key.

2. To go back to the previous page within a section, press ⟨R⟩ (for reverse) followed by the ⟨ENTER⟩ key.
3. Menu pages are numbered from 0-99. Text pages are numbered beginning with 100. You will find the page number at the top of each page, showing the page you are on and the last page of the section.

   For example, "P103 OF 108" means you are on page 103 of the text and that page 108 is the end of the section.

   To proceed to any page of the data base from any other page (forward or back), press ⟨P⟩ (for Page) followed by the page number and the ⟨ENTER⟩ key.

   Example: To view page 105, type:
   ⟨P⟩⟨1⟩⟨0⟩⟨5⟩⟨ENTER⟩
4. To return to a previous sub-menu within the data base, press ⟨M⟩ (for Menu) and the ⟨ENTER⟩ key until the desired menu page is reached.
5. For a shortcut back to the Top Menu, press ⟨T⟩ (for Top) followed by the ⟨ENTER⟩ key.

The Dow Jones Sports Report . . . for Monday morning quarterbacks who want Monday morning's facts.

DOW JONES NEWS/RETRIEVAL® Service
P.O. Box 300
Princeton, New Jersey 08540
1-800-257-5114 (in NJ, 609-452-1511)

Customer Service Notes (From page 14)

```
31Ø IF C$=CHR$(Ø) THEN PRINT #-2, "  BINARY" ELSE
     PRINT #-2, "  ASCII"
32Ø NEXT Y
33Ø NEXT X
34Ø IF FL=Ø THEN A$=B$
     : FL=1
     : GOTO 18Ø
35Ø FL=Ø
     : S=S+1
     : IF S=12 THEN END
36Ø GOTO 17Ø
```

CARRIAGE RETURN/LINE FEED FOR THE COLOR COMPUTER

This program sends a line feed after a carriage return (CR-LF).

```
1ØØ CLS
11Ø DATA Ø52, Ø2Ø, 214, 111, 193, 254
12Ø DATA Ø38, Ø11, 129, Ø13, Ø38, ØØ7, 19Ø
13Ø DATA 16Ø, ØØ2, 173, ØØ3, 134, Ø1Ø, Ø53
14Ø DATA Ø2Ø, Ø57
15Ø FOR D=1ØØØ TO 1Ø21
16Ø READ E
17Ø POKE D, E
18Ø NEXT D
19Ø POKE 1Ø21, PEEK(359)
2ØØ POKE 1Ø22, PEEK(36Ø)
21Ø POKE 1Ø23, PEEK(361)
22Ø POKE 359, 126
23Ø POKE 36Ø, 3
24Ø POKE 361, 232
25Ø END
```

1) Type in the program as written
2) Type: ⟨R⟩⟨U⟩⟨N⟩⟨ENTER⟩
3) When the 'OK' prompt returns, type:
   ⟨N⟩⟨E⟩⟨W⟩⟨ENTER⟩

From this point the computer should react as normal in either Color BASIC or Extended Color BASIC (depending on which computer you have.) No memory needs to be set aside for this program and no memory is taken from the user RAM space.

Note: This program is only effective as long as the computer is left on after following the above directions.

COLOR COMPUTER LINE PRINTER LINE WIDTH DRIVER

```
1ØØ  ''''''''''''''''''''''''''''''''''
     'LINE PRINTER LINE WIDTH DRIVER'
     ''''''''''''''''''''''''''''''''''
11Ø DATA  182, ØØ1, 1Ø3, 167, 141, ØØØ, Ø46, 19Ø,
     ØØ1, 1Ø4, 175, 141, ØØØ, Ø4Ø, 134, 126, 183,
     ØØ1, 1Ø3, Ø48, 141, ØØØ, ØØ4, 191, ØØ1, 1Ø4,
     Ø57, Ø52
12Ø DATA  ØØ2, 15Ø, 111, 129, 254, Ø38, Ø16, 15Ø,
     156, 139, ØØ1, 145, 155, Ø37, ØØ8, Ø15, 156,
     134, Ø13, 173, 159, 16Ø, ØØ2, Ø53, ØØ2, Ø18,
     Ø18, Ø18
13Ø CLS
14Ø INPUT "START ADDRESS"; START
15Ø FOR ADDRESS=START TO START +55
16Ø READ CODE
17Ø POKE ADDRESS, CODE
18Ø NEXT ADDRESS
19Ø EXEC START
```

1) Enter the program as written.
2) Before RUNning the program execute any CLEAR statements or other procedures necessary to protect memory for the program.
3) RUN the program.
4) Respond to the 'START ADDRESS ?' prompt with the address at which you wish the computer to load the machine language routine, and press ⟨ENTER⟩. The routine is 56 bytes long.
5) POKE decimal address 155 with the number of characters per line that you desire PLUS 1. (e.g., If you want 32 characters per line on the printer then POKE 155,33.)

Personnel Manager

We talked in the December and January issues about Time Manager, the first program of the Manager's Series. Time Manager™ along with Personnel Manager™ and Project Manager™ will not do your job for you, but this collection of tools is as invaluable as an extra arm, a 26 hour day, or a "bark" that moves mountains. These amazing aids for any manager keep track of priorities, expenses, people, projects, tasks and much more. This month I have included an article from Image Producers, Inc. the authors of Personnel Manager. Personnel Manager (26-1581, $99.95) will be available soon and is designed for the TRS-80 Model I or III with 48K and two drives.

Written by Phyllis M. Schneider

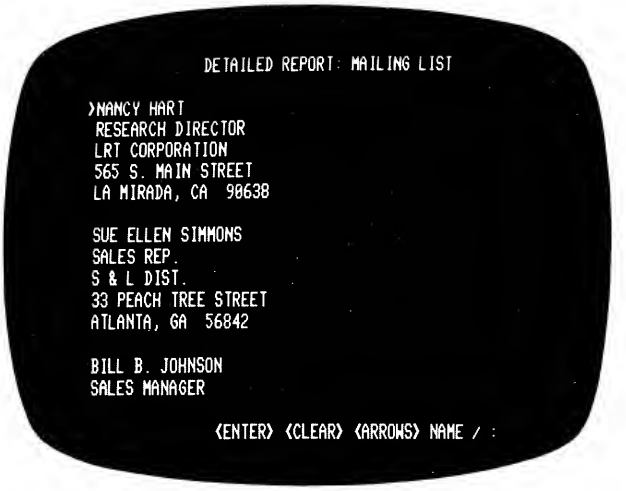
Personnel Manager is a specialized filing system for organizing all types of information. Due to the extreme versatility of this program, applications extending far beyond personnel management are also possible.

Personnel Manager records business and personal information matched to your individual requirements. Its four levels: General, Detailed, Project, and Resume, allow you to examine a general overview of your topic or a very specific report.

The data disk packaged with the program includes personnel management examples organized under sample formats. These examples, when used in conjunction with the manual, provide an overview of the program and its capabilities.

Once familiar with the program, you can change and resort labels and formats to efficiently organize whatever type of information you choose. By making simple modifications, the concept of the program as strictly a personnel management tool becomes individually redefined.

The program is user-definable, and its applications are almost endless. You can easily create bulk mailing lists (presorted by zip code), a directory of frequently dialed telephone numbers, a file of your favorite recipes, a social calendar, a list of important birthdays, anniversaries, holidays and obligations, a duty roster, a vacation schedule, a project assignment/completion table, or any other report appropriate to the program's capabilities and your specific requirements.



You can even specify exactly which portions of your data you do or do not wish to see by setting Personnel Manager's selection feature. By doing so, those records which do not meet certain criteria will be filtered out of the resulting display.

Before leaving on a business trip, for example, you could print a complete list of your clients in Chicago, including phone numbers and other essential information. You could, in a similar manner, obtain a list of all your clients outside of the Chicago area.

Personnel Manager maintains twenty-six category codes of information, originally set to codes relevant to personnel management. The category codes may, however, be altered to suit your particular program application.

Once you have defined and entered information using your category codes, data can be extracted from the Personnel Manager program based solely on those codes. When combined with the selection criteria, very specific information is accessible quickly and easily. A mailing list of all the households in a predefined target market could be prepared with a minimum amount of time and/or effort.

Eight user-definable notepads can be used to store reference information such as phone numbers, miscellaneous notes, review comments, project results, meeting summaries or any other information you will occasionally refer to. The notepads contain command syntax and information for ready reference as you begin using Personnel Manager.

An optional line printer for your Model I or III computer will greatly enhance your use of the Personnel Manager program. Printouts can be obtained of any screen (other than the opening screen), record or report using the printing command. The program allows you to format the page to whatever form is necessary, including mailing labels.

A variety of other special features have been included with the Personnel Manager program. For instance, if you have the Time Manager™ program, you can make and update entries between the two programs without having to re-enter or type additional information. For example, you might transfer actual completion dates from Time Manager to Personnel Manager's Project report to track an individual's record for meeting his deadlines. By using identical category codes, the two programs can be used in conjunction with each other, increasing the usefulness of both products.

The manual included with the program incorporates the examples provided on the original data disk, and can be used as a "walkthrough" guide to Personnel Manager. However, once familiar with the program you will find the applications almost limitless, since all the information on the data disk can be changed, deleted or saved, depending on your individual application requirements. Complete appendices and a reference card outline summarize procedures and program commands.

Compound Interest and Savings

Mike Riggs
Moscow, Idaho

This is a program that I developed during a week-long workshop for educators on programming. The purpose of this program is to demonstrate to students the effect of compound interest on savings accounts.

```
1Ø REM'PROGRAM WRITTEN BY MIKE RIGGS 'BANKER'
   6/19/81
2Ø CLS
   : PRINT "HELLO! WOULD YOU LIKE TO FIND OUT
   HOW COMPOUND INTEREST WORKS ON YOUR SAVINGS
   ACCOUNT?  TYPE IN THE AMOUNT OF PRINCIPLE,
   THE RATE OF INTEREST, AND THE"
   : PRINT "NUMBER OF YEARS.";
3Ø PRINT
   : PRINT
   : X=Ø
   : PRINT
4Ø INPUT"AMOUNT OF PRINCIPLE =";A
5Ø PRINT
   : INPUT "RATE OF INTEREST (PLEASE EXPRESS
   THE PERCENTAGE AS A DECIMAL ) =";B
6Ø PRINT
   : INPUT "NUMBER OF YEARS =";Y
7Ø PRINT
   : FOR Z=1 TO Y
8Ø C=A*B
9Ø A=C+A
1ØØ X=X+1
1Ø5 PRINT
   : PRINT"AFTER YEAR ";X;"---"
11Ø PRINT"SAVINGS BALANCE = $";A; "INTEREST PAID
   = $";C
12Ø NEXT Z
13Ø END
```

Model I/III Bugs, Errors and Fixes

MODEL III TRSDOS (26-312)

Operational note: If you add external drives to your Model III after TRSDOS has booted, or if you boot TRSDOS with the external drives turned off, and then turn the drives on, TRSDOS will not recognize the added drives. Always reboot TRSDOS after adding or turning on external disk drives so TRSDOS will "see" that the drives are available.

Programs like Manufacturing Inventory Control, Accounts Payable and Accounts Receivable can be expanded to use external drives. If you expand to external drives, and the drives were not connected and turned on when you powered up the Model III, it is important that you exit your program properly and reboot TRSDOS with the external drives on before you expand the program capacities.

ACCOUNTS PAYABLE (26-1554)

In versions 3.0 and earlier of Model I Accounts Payable, Vendors can not be added to APS after the maximum number have been added and then some are deleted. The problem is corrected by following the steps listed below.

1. Backup the diskette(s) and make the changes on the Backup copy of the program
2. In BASIC load the program by typing:

```
LOAD "APS" <ENTER>
```

3. Make the following corrections:

CHANGES (Retype the line or refer to the Edit section of the owners manual)

VERSION 3.0:

Old Line:
```
161 P1=Ø:J=VN:IFPV=VN-1THENPL=7Ø4:W1$="VENDOR
    FILE IS FULL"+STRING$(24," "):GOSUB121:
    GOTO157ELSETN=Ø:FORW9=1TO7:V$(W9)="":NEXT
```

New Line:
```
161 P1=Ø:J=VN:IFPV=VN-1-VDTHENPL=7Ø4:
    W1$="VENDOR FILE IS FULL"+STRING$(24," "):
    GOSUB121:GOTO157ELSETN=Ø:FORW9=1TO7:
    V$(W9)="":NEXT
```

VERSIONS PRIOR TO 3.0:

Old Line:
```
51ØP1=Ø:J=VN:IFPC=VNTHENPL=7Ø4:W1$="VENDOR FILE
    IS FULL":GOSUB43Ø:GOTO5ØØ
    ELSEVV=Ø:FORW9=1TO7:V$(W9)="":NEXT
```

New Line:
```
51ØP1=Ø:J=VN:IFPV=VN-VDTHENPL=7Ø4:W1$="VENDOR
    FILE IS FULL":GOSUB43Ø:GOTO5ØØ
    ELSEVV=Ø:FORW9=1TO7:V$(W9)="":NEXT
```

4. Type:

```
SAVE "APS" <ENTER>
```

to save the changes in the program.

5. At TRSDOS Ready, make a backup copy of the corrected diskette.

ACCOUNTS RECEIVABLE (26-1555)

For Model I Accounts Receivable versions prior to 3.0, the manual states: "Once you choose the storage capacity option, you cannot change the capacity until 'End of Period' Processing." At this point, you can increase the number of accounts if you desire. You cannot decrease the account capacity. The problem is that when you attempt to decrease the number, an error message "NO FILES ON DATA DISK" occurs.

The correction given in the March, 1981 Microcomputer News was not correct. Please change line 880 of the program SETUP to read:

```
88Ø PD=2:PC=5ØØ:PT=25ØØ:IFQ$="M"THEN ONERROR
    GOTO895:KILLPT$:PT$=LEFT$(PT$,LEN(PT$)-1)+"2"
    :CLS:PRINT@458, "INSERT DATA DISK IN DRIVE 2
    AND PRESS <ENTER>" ELSE RETURN.
```

Also, please add these additional lines:

```
885 IFINKEY$<>CHR$(13)THEN885 ELSE
    OPEN"R",3,PT$:CLOSE3:ONERRORGOTO6ØØ:RETURN

895 IFERR/2+1=54THENRESUMENEXTELSEONERRORGOTOØ
```

After you have made these changes, be sure to save a copy of the corrected SETUP program.

If you are running out of extents in Model III Accounts Receivable version 3.0, the problem can be corrected by following the steps listed below.

1. Back up the diskette(s) and make the changes on the Backup copy of the program.
2. In BASIC load the program by typing the appropriate filename.
3. Make the following corrections:

Changes to the program ARS (Retype the line or refer to the Edit section of the owners manual):

Old Line:
```
256Ø PI$="CUSINDEX."+P$+":1":
     PD$="CUSDATA."+P$+":1"
```

New Line:
```
256Ø PI$="CUSINDEX."+P$+":1":
     PD$="CUSDATA."+P$+":Ø"
```

After making this change, save ARS and load the program SETUP. Make the following changes to SETUP:

Old Line:
```
47Ø PI$="CUSINDEX."+P$+":1":
    PD$="CUSDATA."+P$+":1":
    PT$="TRANSACT."P$:PS$="CUSSETUP."+P$+":1":
    PG$="GLFILE."+P$+":1":IFPD=2THEN
    PT$=PT$+":2":RETURNELSEPT$=PT$+":1":RETURN
```

New Line:
```
47Ø PI$="CUSINDEX."+P$+":1":
    PD$="CUSDATA."+P$+":Ø":
    PT$="TRANSACT."+P$:PS$="CUSSETUP."+P$+":1":
    PG$="GLFILE."+P$+":1":IFPD=2THEN
    PT$=PT$+":2":RETURNELSEPT$=PT$+":1":RETURN
```

4. After making these changes, save the corrected copy of SETUP and return to TRSDOS READY.
5. Type:

```
COPY CUSDATA.(PASSWORD):1 TO CUSDATA.(PASSWORD):Ø
```

6. When this is done, Type:

```
KILL CUSDATA.(PASSWORD):1
```

7. This should eliminate extent problems with the customer file.

*** NOTE *** It will now be necessary to back up both disks as a set.

MANUFACTURING INVENTORY CONTROL (26-1559)

In all Model I versions of Manufacturing Inventory Control prior to 3.0, it has been found that a problem can occur in Finish Good Maintenance which causes the machine to lock up when updating the files if more than 300 raw materials are in the finished good. The problem is corrected by following the steps listed below.

1. Backup the diskette(s) and make the changes on the Backup copy of the program.
2. In BASIC load the program by typing:

```
LOAD"FGMAINT" <ENTER>
```

3. Make the following corrections:

CHANGES (Retype the line or refer to the Edit section of the owners manual)

```
Old Line:  4 DEFINTI-K,F,R,W-Z:DIMW,WS,WL,WD,PT,X,Y,
               F1$(8,5,4),F(7),IX$(128),FR(1,61Ø),J(3),
               FG$(25,3),FG(25),P$(63),Q$(63)

New Line:  4 DEFINTI-K,F,R,W-Z:DIMW,WS,WL,WD,PT,X,Y,
               F1$(8,5,4),F(7),IX$(128),FR(1,61Ø),J(4),
               FG$(25,3),FG(25),P$(63),Q$(63)

Old Line:  851Ø J(1)=VARPTR(IX(1)):J(2)=VARPTR(FR(Ø,1)):
               J(3)=RQ

New Line:  851Ø J(1)=VARPTR(IX(1)):J(2)=VARPTR(FR(Ø,1)):
               J(3)=RQ:J(4)=HR

Old Line:  1ØØ9Ø FIELD1*146ASUS$:GET1*285:SR$=US$:RETURN

New Line:  1ØØ9Ø FIELD1*149ASUS$:GET1*285:SR$=US$:RETURN
```

Save the corrected program, then make the following changes to "MFGINIT" (Initialization disk)

```
Old Line:  16ØØØ SR$=STRING$(146,32):FORX=1TO146:READY:
               MID$(SR$,X,1)=CHR$(Y):NEXT

New Line:  16ØØØ SR$=STRING$(149,32):FORX=1TO149:READY:
               MID$(SR$,X,1)=CHR$(Y):NEXT

Old Line:  16Ø1Ø FIELD1,146ASQS$:LSETQS$=SR$:PUT1,285:
               SR$="":RETURN

New Line:  16Ø1Ø FIELD1,149ASQS$:LSETQS$=SR$:PUT1,285:
               SR$="":RETURN
```

Replace lines 16030 through 16120 with these lines:

```
16Ø3Ø DATA 2Ø5,127,1Ø,94,35,86,213,221,225,35,94,
     35,86,213,253
16Ø4Ø DATA 225,35,94,35,86,35,78,35,7Ø,3,19,197,
     213,2Ø9,193
16Ø5Ø DATA 11,121,176,2ØØ,197,221,35,221,35,213,
     253,229,225,1,4
16Ø6Ø DATA Ø,27,122,179,4Ø,67,213,221,126,Ø,19Ø,
     35,32,69,221
16Ø7Ø DATA 126,1,19Ø,32,63,2Ø9,43,94,35,86,213,
     35,94,35,86
16Ø8Ø DATA 213,229,2Ø9,43,62,4,245,197,213,229,
     237,184,225,2Ø9,193
16Ø9Ø DATA 241,61,32,243,2Ø9,253,114,3,253,115,2,
     2Ø9,253,114,1
161ØØ DATA 253,115,Ø,253,229,225,17,4,Ø,25,229,
     253,225,2Ø9,27
1611Ø DATA 122,179,213,32,159,2Ø9,193,2Ø1,17,3,
     Ø,25,229,197,225
1612Ø DATA 19,25,229,193,225,2Ø9,27,122,179,4Ø,
     138,213,24,159
```

4. Save the corrected MFGINIT program.
5. At TRSDOS Ready, make a backup copy of the corrected diskette.

MEDICAL OFFICE SYSTEM (26-1568)

In Model III version 1.2 of Medical Office System, the date does not change from the initial date. The problem is corrected by following the steps listed below.

1. Backup the diskette(s) and make the changes on the Backup copy of the program .
2. In BASIC load the program by typing:

```
LOAD "DLYJOUR" <ENTER>
```

3. Make the following corrections:

CHANGES (Retype the line or refer to the Edit section of the owners manual)

```
Old Line:  116Ø LPRINTUSING"TOTAL RECEIPTS: ######.##";
               TT#(2)+TT#(3):LPRINTUSING"TOTAL CHARGES:
               ######.##";TT#(1):FORE=1TO3:TT#(E)=ØDØ:NEXTE:
               LPRINTCHR$(12);:POKE16425,1:IFFQANDMH<=LHTHEN
               D8$=DH$:CN$="":GOSUB1Ø55:GOTO1Ø8OELSEIFNQ>ØAN
               DFQTHEN12ØØELSE56Ø

New Line:  116Ø LPRINTUSING"TOTAL RECEIPTS: ######.##";
               TT#(2)+TT#(3):LPRINTUSING"TOTAL CHARGES:
               ######.##";TT#(1):FORE=1TO3:TT#(E)=ØDØ:NEXTE:
               LPRINTCHR$(12);:POKE16425,1:IFFQANDMH<=LHTHEN
               D8$=DH$:GOSUB34Ø:CN$="":GOSUB1Ø55:GOTO1Ø8Ø
               ELSEIFNQ>ØANDFQTHEN12ØØELSE56Ø
```

4. Type:

```
SAVE"DLYJOUR" <ENTER>
```

to save the changes in the program.

5. At TRSDOS Ready, make a backup copy of the corrected diskette.

Revisions, Enhancements, Etc.

The following is a list of current stock numbers for Computer Software revisions, enhancements and some miscellaneous items. These items can be ordered through your local Radio Shack store. If no price is shown, the item is available at no cost upon proof of purchase of the original program.

MODEL I

700-2007 LPC Driver N/C
With some Radio Shack printers and some early versions of Radio Shack software the "top of form" is increased by one line on each page. The LPC driver corrects this problem.

700-2009 Profile (26-1562 ver. 3.2) N/C
Corrects printing problems that existed in earlier versions of Profile.

700-2110 Tandygraph disk for 26-1191 N/C
Multi-pen Plotter

700-2220 VisiCalc (26-1566) DIF Documentation N/C
Programmer's Guide to the Data Interchange Format. Not included with any Model I VisiCalc packages.

700-2222 Payroll Disks & Manual (26-1556) $25.00
Includes the 1982 tax tables and a program change to allow the W-2 program to be user formattable. (There are no W-2 changes for 1981.)

700-3004 TRSDOS 2.3 (26-2104) $ 5.00
This manual incorporates all the changes that have been made to the previous TRSDOS 2.3 manual

700-5210 FORTRAN Source Files for 26-2201 N/C
Diskette containing the Sample Source Files for 26-2201

700-6001 Mailing List Exchange $60.00
Upgrade Disk Mailing List (26-1551) to Business Mailing List (26-1558).

MODEL III

700-2006 Disk Scripsit (26-1563 Ver. 3.2) N/C
on TRSDOS 1.3

700-2008 Versafile (26-1604) on TRSDOS 1.3 N/C

700-2010 Profile (26-1562 ver 3.2) N/C
on TRSDOS 1.3

700-2012 Microfiles (26-1565) on TRSDOS 1.3 N/C

700-2112 Tandygraph disk for 26-1191 N/C
Multi-pen Plotter

700-2214 General Ledger Disks & Addenda N/C
(26-1552 Ver. 3.0) on TRSDOS 1.3

700-2215 Inventory Control System version 3.0 N/C
Disks & Manual (26-1553)

700-2216 Accounts Payable version 3.1 N/C
Disks & Addenda (26-1554)
700-2217 Accounts Receivable version 3.1 N/C
Disks & Addenda (26-1555)
700-2218 Manufacturing Inventory Control N/C
version 3.0 Disks & Addenda (26 -1559)
700-2219 Standard & Poor's Disks & Manual N/C
(26-1507) on TRSDOS 1.3
700-2220 VisiCalc DIF Documentation N/C
Programmer's Guide to the Data Interchange Format. Not included with Model III VisiCalc packages prior to enhanced version of VisiCalc (26-1569)
700-2232 TRSDOS 1.3 Disk & Manual N/C
For owners of Model III Disk Systems who never received the final Disk System Owner's Manual and TRSDOS 1.3 diskette.
700-3210 VisiCalc Replacement Disk (26-1566) $25.00
For owners who have destroyed or have unusable original VisiCalc program diskettes.
700-3211 Scripsit Replacement Disk (26-1563) $25.00
For owners who have destroyed or have unusable original Scripsit program diskettes.
700-6200 VisiCalc Exchange Disk $99.05
Enhanced version of Model III VisiCalc. Owner must provide the exchange card included in the VisiCalc manual and pay the difference between the earlier program and the enhanced Mod III VisiCalc ($99.05) to obtain the enhanced version.

Arrays

Linda Miller

Arrays are everywhere. As you walk into a cafeteria you are met with arrays of salads, entrees, desserts, vegetables, breads, and other miscellaneous edibles. An array is an assortment of things or elements which are usually related in some way. The elements in the vegetable array are carrots, peas, spinach, cauliflower, etc. A telephone directory is an array of names, addresses, and phone numbers as well as other miscellaneous information. Array elements are whatever you want them to be, and the order of the elements depends on how they are input into the array.

In BASIC, a single array element is represented by a subscripted variable. Variable N$(10) tells us that:

1. N$ is the name of a string array. N(10) would refer to a numeric array.
2. Number 10 in parentheses (the subscript) indicates that this is element number 11 (zero (0) is element number one) of array N$.

Enter the following program.

```
10 CLEAR 500
20 FOR X = 1 TO 10
30 PRINT "ENTER LAST NAME # "; X; " ";
    : INPUT N$(X)
40 NEXT
```

The first time line 30 is executed the computer notes that there will be a string array named N$ that will have at most 11 elements. Eleven, because that is the default size of an undimensioned array. Default means that unless specified otherwise by a dimension statement (DIM) the array will hold not more than eleven elements.

A dimension statement overrides the default. DIM X$(15) creates a string array named X$ that will have up to 16 elements. An array can have one dimension— e.g. DIM K(50)—or more than one dimension—e.g. DIM L(15,30), DIM M$(5,14,3), etc. A single dimensioned array was created in the example program where 10 last names were entered. As an additional word of caution when dimensioning an array, if an array has previously been dimensioned by default and the same array is dimensioned again with a DIM statement, the result will be a DD or Redimensioned array error message. The following brief program illustrates this.

```
10 A$(5)="HELLO"
20 DIM A$(15)
RUN
DD ERROR IN 20
```

Elements in an array are numbered from 0 to N where N is the highest numbered element. Enter and run the following program.

```
10 FOR X = 0 TO 10
20 INPUT "ENTER A NUMBER"; NU(X)
30 NEXT X
```

If there were no mistakes when keying in the program then you should have been able to enter 11 numbers. Edit line 10 to read:

```
10 FOR X = 1 TO 11
```

Input of eleven numbers is still requested, but when the eleventh element is entered the video displays:

```
?BS ERROR IN 20
```

A BS error, or "subscript out of range," occurred because the eleven elements in the array are numbered NU(0), NU(1), NU(2), . . . NU(10). The first element in any array is subscripted with 0. Often, as in the previous program to input 10 last names, the 0 element is ignored. When a subscript exceeds

1) the number 10 of an array that has been subscripted by default,

or

2) the subscript numbers specified in the DIM statement, then a BS error occurs.

As long as the subscript of an array does not exceed 10 in any one dimension and more than three dimensions, the array does not have to be dimensioned. For example array X$(10,10,10) does not have to be dimensioned but array Y$(2,3,4,4) does because it has more than three dimensions.

The two example programs—one a list of ten last names and the other a list of ten numbers—used single dimensioned arrays. The length of either list could be increased (or decreased) by using a DIM statement and changing the limits of the FOR/NEXT loops. The statement

```
10 DIM CLIENT$(14, 3)
```

creates a two dimensional string array named CLIENT$. It has 15 rows (0 - 14) and 4 columns (0 - 3). The positions of the elements can be visualized like this.

0,0	0,1	0,2	0,3
1,0	1,1	1,2	1,3
2,0	2,1	2,2	2,3
.	.	.	.
.	.	.	.
.	.	.	.
14,0	14,1	14,2	14,3

Enter and run the following program inputing your own "dummy" data.

```
1Ø CLEAR 1ØØØ
2Ø DIM CLIENT$(14, 3)
3Ø FOR N = 1 TO 14
4Ø PRINT " ENTER NAME OF CLIENT # "; N;
     : INPUT CLIENT$(N, 1)
5Ø PRINT "ENTER THE OCCUPATION OF CLIENT # "; N;
     : INPUT CLIENT$(N, 2)
6Ø PRINT "ENTER THE AGE OF CLIENT # "; N;
     : INPUT CLIENT$(N, 3)
7Ø CLS
     : NEXT N
8Ø ' THE ARRAY CLIENT$ WILL BE PRINTED OUT ON THE
     DISPLAY
9Ø FOR N = 1 TO 14
1ØØ PRINT CLIENT$(N, 1) TAB 3Ø CLIENT$(N, 2)
     TAB(45) CLIENT$(N, 3)
11Ø NEXT N
```

Because positions 0,0; 0,1; . . . 0,3 and 1,0; 2,0; . . . 14,0 were ignored by the program, the data is stored in the following array positions:

1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	3,3
.	.	.
.	.	.
.	.	.
14,1	14,2	14,3

Adding line 130 causes the program to print out a list of the client names only.

```
13Ø FOR N = 1 TO 14
     : PRINT CLIENT$(N,1)
     : NEXT
```

All of the TRS-80 computers provide for the use of arrays. The Pocket Computer allows the creation of an array named A (or A$) which is single dimensioned. Similarly the Model I/III Level I computers provide for a single array named A subscripted by one number. The Model I Level II, Model III with Model III BASIC, Model II, Color Computer (4K and extended Color BASIC) enable you to have multiple arrays with more than one dimension.

TRS-80 users have created a wide variety of applications using arrays. If you have discovered a way of using an array that you think might be interesting to others, please write to us.

NOTE: When clearing string space always put the CLEAR statement before the DIM statement or the array will be redimensioned to the default setting.

Array Input Routine

Louis Self
Phoenix, AZ

It is often necessary to input arrays of information into your BASIC programs. For example, if we needed to input the following values from weather observations:

Time	Temp	Wind Dir.	Vel.	Rainfall	Humid.	Sky Cover
8	78	090	10	.00	.36	.1
9	80	110	5	.00	.40	.1
10	84	090	7	.00	.50	.2
11	88	085	3	.00	.45	.3
12	90	094	6	.00	.60	.2
1	95	088	4	.00	.70	.3
2	98	090	2	.00	.85	.45
3	100	090	1	.00	.95	.6
4	100	090	0	.00	1.00	.8
5	96	090	10	.40	.95	.9
6	93	098	5	.40	.95	.7
7	90	095	2	.40	.8	.5
8	85	100	1	.40	.8	.4
9	80	105	3	.40	.75	.1

A typical INPUT routine might look like this:

```
9Ø DIM A(13, 6)
1ØØ FOR X=Ø TO 13
11Ø FOR Y=Ø TO 6
12Ø PRINT X; Y;
     : INPUT A(X, Y)
13Ø NEXT Y, X
```

This routine will allow us to INPUT the information, but error checking may be difficult. It is also very easy to "get lost" while entering information with this type of routine, you enter one item twice, or skip a time completely.

What is needed is an array input routine which would allow us to see our information in its array format as we input it. This will make error detection much easier, since it will be obvious if we input a wind direction value into the rainfall column.

The following program is designed to simplify input of information into arrays. The routine uses a combination of PRINT TAB and INPUT to both get the information into the array and display the information in array format. Here is the program:

```
2Ø CLS
3Ø DIM A(14, 7)
4Ø PRINT"ENTER     A(X,Ø)  A(X,1)  A(X,2)  A(X,3)
     A(X,4)  A(X,5)  A(X,6)"
5Ø FOR X=Ø TO 13
6Ø PRINT "X ="X
7Ø FOR Y=Ø TO 6
8Ø PRINT TAB(Y * 8 + 8) CHR$(27);
9Ø INPUT A(X, Y)
1ØØ NEXT Y
11Ø NEXT X
```

Line 30 DIMensions the array A to the size needed (14 by 7 in this example).

Line 40 PRINTs an initial line on the video to help prompt the user for the needed information.

Line 50 sets up the FOR-NEXT loop for the 14 (0 to 13) X elements.

Line 60 prints a row identifier (X=) so the user will know which row of information is being requested.

Line 70 sets up the FOR-NEXT loop to input each of the 7 (0 to 6) items of information associated with each row.

Line 80 uses the value of Y (column number) to position the next INPUT statement. The columns will be INPUT beginning at TAB(8) when Y=0 (0*8 + 8=8), and continue to the last column of TAB(56) when Y=6 (6*8+8). The CHR$(27) moves the cursor up one line on the Model I and III. (CHR$(27) has an entirely different function on the Model II.)

Line 90 actually INPUTs the value into array element A(X,Y).

Lines 100 and 110 end the two FOR-NEXT loops.

When you run this program, the screen will clear, the heading row will appear, and one line down, X=0 will be displayed.

Next, a question mark will appear just to the right of X=0. Input the first Time value. Just to the right a second question mark will appear on the same line. Enter the first Temperature. As you continue to enter values, the computer continues across the line printing question marks for INPUT.

After you have entered the Sky Cover for X=0, the computer will move to the beginning of the next line, PRINT X=1, and begin requesting the next row of values.

As you continue to enter values, the information will be lined up in the same rows and columns as the original table. This makes it very easy to see when and where errors have occurred, and makes it easier to return to data entry if you happen to be interrupted.

Mr. Self included a second program for data output so you would have a complete set of Input/Output routines:

```
12Ø '----THE FOLLOWING PRINTS OUT THE ARRAY----
13Ø INPUT"PRESS ENTER TO PRINT OUT THE ARRAY";X
14Ø FOR X=Ø TO 13
14Ø FOR Y=Ø TO 6
16Ø PRINT A(X, Y);
17Ø NEXT Y
18Ø PRINT
19Ø NEXT X
```

Client Activity Information Array

Kenneth E. Robinson
7409 N. Garfield
Gladstone, MO 64118

Client Activity Information Array is a program designed to keep track of clients, customers, patients, etc. When I was asked if a program existed that would keep track of about 140 clients at a rest home and keep track of which activities they attended such as bingo games, I could not find such a program. At least I could not find a program that would do it for a 16K computer. So I set out to reach into the recesses of my mind for a way to keep track of that much information. An array using only yes or no seemed the only way.

The Client Activity Information Array program will allow you to list each client, describe each item, and tell the computer if that item applies to the client. The computer will then read which items apply to the client, how many clients are listed for an item, and what the names of the clients are. The computer will also let you change the information in the array as to name of the client, description of the item, and if the item applies to the client. Information can be stored on a cassette tape and put back into the computer later.

```
1Ø CLS
     : PRINT "CLIENT ACTIVITY INFORMATION ARRAY"
2Ø PRINT, "written by Kenneth E. Robinson, July
     16, 1981"
3Ø FOR T=1 TO 8ØØ
     : NEXT T
4Ø CLEAR 5Ø75
     : ON ERROR GOTO 12ØØ
5Ø G=14Ø1
55 CLS
6Ø INPUT "HOW MANY CLIENTS DO YOU EXPECT TO
     HAVE"; B
7Ø INPUT "HOW MANY ITEMS DO YOU WISH TO MONITOR";
     C
8Ø IF B*C<G GOTO 9Ø ELSE PRINT "TOO MUCH DATA FOR
     A 16K COMPUTER"
     : GOTO 6Ø
9Ø DIM G$(B, C)
1ØØ INPUT "DO YOU HAVE DATA ALREADY STORED ON
     CASSETTE TAPE (tape data must match client
     and item amounts just selected)"; F$
11Ø IF LEFT$(F$, 1)="Y" GOTO 1ØØØ ELSE 12Ø
12Ø CLS
     : FOR A=1 TO C
13Ø PRINT "WHAT IS ITEM #"; A
14Ø INPUT G$(P, A)
15Ø NEXT A
16Ø FOR P=1 TO B
17Ø A=Ø
18Ø PRINT"FOR CLIENT #"; P
19Ø PRINT"WHAT IS THE CLIENT'S NAME"
2ØØ INPUT G$(P, A)
21Ø FOR A=1 TO C
22Ø PRINT"THIS IS FOR ITEM #"; A; "("; G$(Ø, A);
     ") FOR CLIENT #"; P; "("; G$(P, Ø); ")";
23Ø PRINT" INPUT <Y> OR <YES> IF THIS ITEM
     APPLIES TO THIS CLIENT, OTHERWISE INPUT <N>
     OR <NO> THEN <ENTER>."
24Ø INPUT G$(P, A)
25Ø NEXT A
26Ø IF P=B GOTO 3ØØ
27Ø PRINT "DO YOU HAVE MORE INFORMATION TO BE
     STORED"
28Ø INPUT I$
29Ø IF LEFT$(I$, 1)="Y" THEN GOTO 3ØØ ELSE P=B+1
```

```
300 NEXT P
305 CLS
310 PRINT"PRESS <1> TO READ CLIENT INFORMATION"
320 PRINT"      <2> TO READ TOTAL CLIENTS LISTED
    FOR AN ITEM"
330 PRINT"      <3> TO READ NAMES OF CLIENTS
    LISTED FOR AN ITEM"
340 PRINT"      <4> TO CHANGE CLIENT INFORMATION"
350 PRINT"      <5> TO CHANGE ITEM DESCRIPTION"
355 PRINT"      <6> TO CHANGE ONE ITEM FOR ONE
    CLIENT"
360 PRINT"      <7> TO RESTORE INFORMATION ON
    CASSETTE TAPE"
370 PRINT"      <8> TO RETRIEVE INFORMATION FROM
    CASSETTE TAPE"
380 INPUT K
    : IF K<1 GOTO 380
390 IF K>8 PRINT"ONLY SELECTIONS LISTED ARE
    PERMITTED"
    : GOTO 310
400 ON K GOTO 410, 500, 600, 700, 800, 1100, 900,
    1000
410 CLS
    : INPUT "WHAT IS CLIENT'S NUMBER - All
    clients must be assigned a number starting
    with 1"; P
    : J=0
420 IF P<1 OR P>B THEN PRINT "THAT CLIENT IS NOT
    LISTED IN COMPUTER"
    : GOTO 310
425 PRINT "CLIENT NO."; P; "("; G$(P, 0); ")"
430 FOR A=1 TO C
440 PRINT "ITEM NO."; A; "("; G$(0, A); ") ";
450 IF LEFT$(G$(P, A), 1)="Y" THEN PRINT "YES"
    ELSE PRINT "NO"
460 J=J+1
    : IF J>14 INPUT "PRESS <ENTER> TO CONTINUE
    READING ITEMS"; Z
    : J=0
470 NEXT A
480 INPUT "PRESS <ENTER> TO CONTINUE"; Z
490 GOTO 305
500 CLS
    : INPUT "WHICH ITEM ARE YOU INTERESTED IN";
    A
510 IF A<1 OR A>C THEN PRINT "THAT ITEM IS NOT
    LISTED"
    : GOTO 310
520 E=0
530 FOR P=1 TO B
540 IF LEFT$(G$(P, A), 1)="Y" THEN N=1 ELSE N=0
550 E=E+N
560 NEXT P
570 PRINT "TOTAL NUMBER OF CLIENTS LISTED FOR
    ITEM #"; A; "("; G$(0, A); ") IS"; E"."
580 INPUT "PRESS <ENTER> TO CONTINUE"; Z
590 GOTO 305
600 CLS
    : INPUT "WHAT ITEM ARE YOU INTERESTED IN"; A
    : J=0
610 IF A>C THEN PRINT "THAT ITEM DOES NOT EXIST
    IN COMPUTER FILES"
    : GOTO 310
620 FOR P=1 TO B
630 IF LEFT$(G$(P, A), 1)="Y" THEN PRINT G$(P, 0)
    ELSE 650
640 J=J+1
    : IF J<15 GOTO 650 ELSE INPUT "PRESS <ENTER>
    TO CONTINUE READING NAMES"; Z
    : J=0
650 NEXT P
660 INPUT "PRESS <ENTER> TO CONTINUE"; Z
670 GOTO 305
700 CLS
    : INPUT "FOR WHICH CLIENT WOULD YOU LIKE TO
    CHANGE THE INFORMATION"; P
710 IF P<1 OR P>B PRINT "CLIENT NUMBER NOT
    LISTED.  TO CHANGE NUMBER OF CLIENTS YOU
    MUST RE-INPUT ALL INFORMATION"
    : GOTO 310
720 INPUT "CLIENT'S NAME"; G$(P, 0)
730 FOR A=1 TO C
740 PRINT "ITEM NO."; A; "("; G$(0, A); ") FOR
    CLIENT NO."; P
750 INPUT "INPUT <YES> IF THIS ITEM APPLIES TO
    THIS CLIENT, OTHERWISE INPUT <NO>"; G$(P, A)
760 NEXT A
770 GOTO 305
800 CLS
    : INPUT "WHICH ITEM DESCRIPTION DO YOU WISH
    TO CHANGE"; A
810 PRINT "ITEM"; A; "IS--"; G$(0, A); "--THIS
    ITEM DESCRIPTION IS BEING CHANGED FOR ALL
    CLIENTS."
820 INPUT "HOW DO YOU WANT TO DESCRIBE THIS
    ITEM"; G$(0, A)
830 INPUT "DO YOU WISH TO CHANGE CLIENT
    INFORMATION FOR THIS ITEM"; L$
840 IF LEFT$(L$, 1)="N" GOTO 305
850 FOR P=1 TO B
860 PRINT "THIS IS ITEM #"; A; "("; G$(0, A); ")
    FOR CLIENT #"; P; G$(P, 0)
870 INPUT "DOES THIS ITEM APPLY TO THIS CLIENT";
    G$(P, A)
880 NEXT P
890 GOTO 305
900 CLS
    : INPUT "   PRESS <ENTER> WHEN CASSETTE IS
    READY TO BEGIN RECORDING INFORMATION ON
    TAPE.  BE SURE TAPE IS REWOUND AND RECORDER
    IS IN RECORD MODE.  USE A 'CLEAN' LEADERLESS
    90 MIN. TAPE."; Z
910 PRINT "THE DATA IS NOW BEING INPUT FROM THE
    COMPUTER INTO THE CASSETTE RECORDER."
920 FOR P=0 TO B
    : PRINT P;
930 FOR A=0 TO C
940 PRINT # -1, G$(P, A)
950 H=H+1
    : IF H>1400 INPUT "PRESS <ENTER> WHEN NEW
    TAPE IS READY TO RECORD INFORMATION"; Z
    : H=0
960 NEXT A, P
970 PRINT "THE DATA HAS BEEN STORED ON TAPE.  YOU
    MAY TURN OFF THE RECORDER NOW."
975 PRINT "N O T I C E : You may want to make
    extra copies of data tape!"
980 INPUT "PRESS <ENTER> TO CONTINUE"; Z
990 GOTO 305
1000 CLS
    : INPUT " PRESS <ENTER> WHEN CASSETTE IS
    READY TO BEGIN PLAYING STORED  DATA BACK
    INTO COMPUTER.  BE SURE TAPE IS REWOUND AND
    PLAYER IS IN PLAY MODE."; Z
1010 PRINT " THE DATA IS NOW BEING INPUT FROM THE
    CASSETTE PLAYER INTO THE COMPUTER."
1020 FOR P=0 TO B
    : PRINT P;
1030 FOR A=0 TO C
1040 INPUT # -1, G$(P, A)
1050 H=H+1
    : IF H>1400 INPUT "<ENTER> WHEN NEW TAPE IS
    READY TO INPUT MORE INFORMATION INTO
    COMPUTER"; Z
    : H=0
1060 NEXT A, P
1070 PRINT "THE DATA HAS BEEN READ INTO THE
    COMPUTER.  YOU MAY TURN OFF THE PLAYER NOW."
1080 INPUT "PRESS <ENTER> TO CONTINUE"; Z
1090 GOTO 305
1100 CLS
1110 INPUT "WHAT IS THE CLIENT NUMBER"; P
1120 IF P<1 OR P>B PRINT "THAT CLIENT NUMBER IS
    NOT LISTED"
    : GOTO 1110
1130 INPUT "WHAT IS THE ITEM NUMBER THAT NEEDS
    CHANGED"; A
1140 IF A<1 OR A>C PRINT "THAT ITEM IS NOT IN
    COMPUTER"
    : GOTO 1110
```

```
115Ø INPUT "INPUT A <YES> OR <NO> FOR ITEM";
     G$(P, A)
116Ø PRINT "FOR CLIENT NO."; P; "("; G$(P, Ø); ")
     INFORMATION IN ITEM NO."; A; G$(Ø, A); " HAS
     BEEN CHANGED TO "; G$(P, A)
117Ø INPUT "PRESS <ENTER> TO CONTINUE"; Z
118Ø GOTO 3Ø5
12ØØ IF ERR/2+1 = 14 PRINT "OOPS...OUT OF SPACE."
     : RESUME 31Ø
121Ø IF ERR/2+1 <> 14 PRINT "!!! PROGRAM IS IN
     TROUBLE !!!"
     : RESUME 6Ø
```

To fast test this program after entering, change the following lines:

```
14Ø G$(P, A)="TEST ITEM"
2ØØ G$(P, A)="KENNETH E. ROBINSON"
24Ø G$(P, A)="YES"
28Ø I$="YES"
```

Then look for screen outputs similar to these:

CLIENT ACTIVITY INFORMATION ARRAY
written by Kenneth E. Robinson, July 16, 1981

HOW MANY CLIENTS DO YOU EXPECT TO HAVE? 150
HOW MANY ITEMS DO YOU WISH TO MONITOR? 25
TOO MUCH DATA FOR A 16K COMPUTER
HOW MANY CLIENTS DO YOU EXPECT TO HAVE? 140
HOW MANY ITEMS DO YOU WISH TO MONITOR? 10
DO YOU HAVE DATA ALREADY STORED ON CASSETTE TAPE (tape data must match client and item amounts just selected)? N

Computer screen should start changing while information is being input by program into array. Then, if the program is good, the following screen will display.

PRESS ⟨**1**⟩ TO READ CLIENT INFORMATION
⟨**2**⟩ TO READ TOTAL CLIENTS LISTED FOR AN ITEM
⟨**3**⟩ TO READ NAMES OF CLIENTS LISTED FOR AN ITEM
⟨**4**⟩ TO CHANGE CLIENT INFORMATION
⟨**5**⟩ TO CHANGE ITEM DESCRIPTION
⟨**6**⟩ TO CHANGE ITEM FOR ONE CLIENT
⟨**7**⟩ TO STORE INFORMATION ON CASSETTE TAPE
⟨**8**⟩ TO RETRIEVE INFORMATION FROM CASSETTE TAPE
? 1

WHAT IS CLIENT'S NUMBER - All clients must be assigned a number starting with 1? 150
THAT CLIENT IS NOT LISTED IN COMPUTER
PRESS ⟨**1**⟩ TO READ CLIENT INFORMATION
⟨**2**⟩ TO READ TOTAL CLIENTS LISTED FOR AN ITEM
⟨**3**⟩ TO READ NAMES OF CLIENTS LISTED FOR AN ITEM
⟨**4**⟩ TO CHANGE CLIENT INFORMATION
⟨**5**⟩ TO CHANGE ITEM DESCRIPTION
⟨**6**⟩ TO CHANGE ONE ITEM FOR ONE CLIENT
⟨**7**⟩ TO STORE INFORMATION ON CASSETTE TAPE
⟨**8**⟩ TO RETRIEVE INFORMATION FROM CASSETTE TAPE
? 1

WHAT IS CLIENTS' NUMBER - All clients must be assigned a number starting with 1? 1

ITEM NO. 1 (TEST ITEM) YES
ITEM NO. 2 (TEST ITEM) YES
ITEM NO. 3 (TEST ITEM) YES
ITEM NO. 4 (TEST ITEM) YES
ITEM NO. 5 (TEST ITEM) YES
ITEM NO. 6 (TEST ITEM) YES
ITEM NO. 7 (TEST ITEM) YES

2

WHICH ITEM ARE YOU INTERESTED IN? 1
TOTAL NUMBER OF CLIENTS LISTED FOR ITEM #1 (TEST ITEM) IS 140.
PRESS ⟨**ENTER**⟩ TO CONTINUE?

3

WHAT ITEM ARE YOU INTERESTED IN? 1

KENNETH E. ROBINSON
KENNETH E. ROBINSON
KENNETH E. ROBINSON
KENNETH E. ROBINSON
KENNETH E. ROBINSON
PRESS ⟨**ENTER**⟩ TO CONTINUE READING NAMES?

4

FOR WHICH CLIENT WOULD YOU LIKE TO CHANGE THE INFORMATION? 1
CLIENT'S NAME? JANET L. WILLINGHAM
ITEM NO. 1 (TEST ITEM) FOR CLIENT NO. 1
INPUT ⟨**YES**⟩ IF THIS ITEM APPLIES TO THIS CLIENT, OTHERWISE INPUT ⟨**NO**⟩? NO
ITEM NO. 2 (TEST ITEM) FOR CLIENT NO. 1
INPUT ⟨**YES**⟩ IF THIS ITEM APPLIES TO THIS CLIENT, OTHERWISE INPUT ⟨**NO**⟩? YES

WHICH ITEM DESCRIPTION DO YOU WISH TO CHANGE? 2
ITEM 2 IS —TEST ITEM—THIS ITEM IS BEING CHANGED FOR ALL CLIENTS
HOW DO YOU WANT TO DESCRIBE THIS ITEM? CHANGED TEST
DO YOU WISH TO CHANGE CLIENT INFORMATION FOR THIS ITEM? NO

5

WHICH ITEM DESCRIPTION DO YOU WISH TO CHANGE? 3
ITEM 3 IS—TEST ITEM—THIS ITEM IS BEING CHANGED FOR ALL CLIENTS.
HOW DO YOU WANT TO DESCRIBE THIS ITEM? CLOSED SALE
DO YOU WISH TO CHANGE CLIENT INFORMATION FOR THIS ITEM? YES
THIS IS ITEM #3 (CLOSED SALE) FOR CLIENT #1 JANET L. R OBINSON
DOES THIS ITEM APPLY TO THIS CLIENT? YES
THIS IS ITEM #3 (CLOSED SALE) FOR CLIENT #2 KENNETH E. ROBINSON
DOES THIS ITEM APPLY TO THIS CLIENT? NO

6

WHAT IS THE CLIENT NUMBER? 4
WHAT IS THE ITEM NUMBER THAT NEEDS CHANGED? 4
INPUT A ⟨**YES**⟩ OR ⟨**NO**⟩ FOR THIS ITEM? YES
FOR CLIENT NO. 4 KENNETH E. ROBINSON INFORMATION IS ITEM NO. 4
TEST ITEM HAS BEEN CHANGED TO YES
PRESS ⟨**ENTER**⟩TO CONTINUE?

7

PRESS ⟨**ENTER**⟩ WHEN CASSETTE IS READY TO BEGIN RECORDING INFORMATION ON TAPE. BE SURE TAPE IS REWOUND AND RECORDER IS IN RECORD MODE. USE A 'CLEAN' LEADERLESS 90 MIN. TAPE?
THE DATA IS NOW BEING INPUT FROM THE COMPUTER INTO THE CASSETTE RECORDER.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

8

PRESS ⟨**ENTER**⟩ WHEN CASSETTE IS READY TO BEGIN PLAYING STORED DATA BACK INTO COMPUTER. BE SURE TAPE IS REWOUND AND PLAYER IS IN THE PLAY MODE?

THE DATA IS NOW BEING INPUT FROM THE CASSETTE PLAYER INTO THE COMPUTER.

Congratulations. If you have made it this far, you are ready to reset lines 140, 200, 240, and line 280 to values listed in program. After the program is returned to its original values you should run the program using small values for client and item amounts (the small values are needed to save time). Remember all programs should be tested to see if it will work for your conditions. You are the only one who knows if this program does what you need it to do.

The client activity information array is a program in BASIC written to allow the small business user to take a microcomputer and use it to keep track of his clients. This array will give you a yes or a no for items that you may want to keep track of for each client that you may have. The program is written in BASIC for easy input. All outputs are written in easy to understand instructions and meaningful information. After data is put into your program changes are easy and the computer will keep track of your clients, customers, patients, etc.

Notes on Previous Issues

December, 1981

MODEL I/III CALENDAR PROGRAM CORRECTIONS

Several people have written with suggested changes or corrections to the Model I/III Monthly Calendar program we printed in the December, 1981 issue.

The most obvious problem was that the calendar had two Augusts and no September. Change line 290 to read:

```
290 DA=DA+243
    : E=30
    : LPRINT TAB(20) "SEPT"; YR
    : RETURN
```

The second problem deals with leap years. Here is a loose excerpt from the letter we received from Mr. Norman Carlile:

Mr. Carlile stated that he hated to be "nit-picking" since the first time in the future that the produced calendar will be wrong will be for January and February 2100. The same will be true for the years 2200 and 2300. However, if some historian uses this program in connection with his studies for January and February of the years 1800 & 1900 he will be a day off. Also, all calendars from January 1700 through December 1752 will likely be wrong.

He went on with . . . My research shows that when Pope Gregory XIII introduced his calendar in 1582 he corrected an error in the Julian calendar by changing Julian 5 October to Gregorian 15 October. I have been unable so far to determine what adjustment was made when Great Britain and the American Colonies finally adopted the Gregorian calendar during 1752, but any calendar produced by the program prior to 1753 is likely incorrect.

Mr. Carlile also states that to reduce the error in the calendar Pope Gregory XIII restricted centesimal years as leap years to only those evenly divisible by 400. Therefore century years such as 2000, 2400, 2800 are leap years while others such as 1700, 1800, 1900, 2100, etc. are not leap years.

Mr. Carlile then produced results from the published program which show that 31 Dec 1799 and 1 Jan 1800 are both computed to be on the same day of the week, while December, 1999 and January, 2000 are correct since 2000 is a leap year.

Mr. Carlile and Mr. George Clendenin provided us with revised or new calendar programs which overcome these problems.

To correct the program we published in December, Mr. Jim Johnston suggested adding these lines:

```
57 IF (M=1 OR M=2) AND (INT(YR/100)=YR/100) GOSUB
     450
450 IF INT(YR/400)=YR/400 RETURN
460 IF M=2 THEN E=E-1
470 B=B+1
480 IF B=7 THEN B=0
490 RETURN
```

Mr. Johnston also commented "Line 480 can be omitted as the program overflows at year 2328, before B ever is 7. This is of little consequence as the calendar will probably be revised long before then. I might note that the Gregorian calendar did not start in the American colonies until Sept. 14, 1752."

Mr. John Henson suggests that the leap year problem can be solved by simply changing line 41 to read:

```
41 IF (YR/4=INT(YR/4)) THEN FD=1
     : IF (YR/100=INT(YR/100)) AND
     (YR/400<>INT(YR/400)) THEN FD=0
```

Our thanks to L. H. Erb and Jeffrey W. Pettiross who also commented on the program.

January, 1982

In the VisiCalc article (Page 17), the formula for B11 (calculation for Principal and Interest) contains an error. The correct formula for Model I/III computers is:

+B7*(B8/100)/(1-((1+(B8/100))^-(B4*B5-1)))

Notice the addition of a set of parenthesis around B4*B5-1 just after the exponentiation symbol (^ use an up arrow on Model I/III).

This same formula will work with Model II VisiCalc, but only to a point. In the example given, you will only be able to use 28 years. After 28, you will get a lot of ERROR flags. The problem is in the Model II VisiCalc exponentiation function.

Mr. Ralph K. Schmitz of International Marketing Consultants, Inc. of Fort Worth provided us with the following alternate formula for B11 on a Model II:

+B7*(B8/100)+(B7*(B8/100)/((1+(B8/100))^+(B4*B5-1)))

Mr. Schmitz commented that there will be a few cents difference in the monthly payment using the two different formulas, but the second formula works on the Model II and is not affected by the exponentiation problem.

Educational Courseware for Graph Analysis in High School Physics

Graphical Analysis of Experimental Data and Interpreting Graphs in Physics are two problem-solving courseware programs designed for use in the secondary physics classroom. Like Advanced Graphics and Vector Addition, featured in last month's Education article, these programs were designed and programmed by Richard Born, a Radio Shack consultant with fourteen years of experience in teaching high school math, physics, and computer science.

GRAPHICAL ANALYSIS OF EXPERIMENTAL DATA

Graphical Analysis of Experimental Data enables high school students to use the computer when graphing and studying data that they have gathered through experiment or research. The program is especially suited for use in the lab, where your students can use the TRS-80 to analyze experiment results as soon as data have been gathered.

The Graphical Analysis of Experimental Data program was first used in author Richard Born's physics class, where high school students were busy performing experiments in which they controlled one variable and measured another variable. Born has found that the program supports in-class analysis of experiment results by allowing students to see important patterns in their data while they skip some of the tedious work involved in constructing graphs manually. Because students can perform linear analysis quickly with the program, they often discover significant tendencies which suggest promising variations on the experiments. Students can then explore these variations immediately, in class.

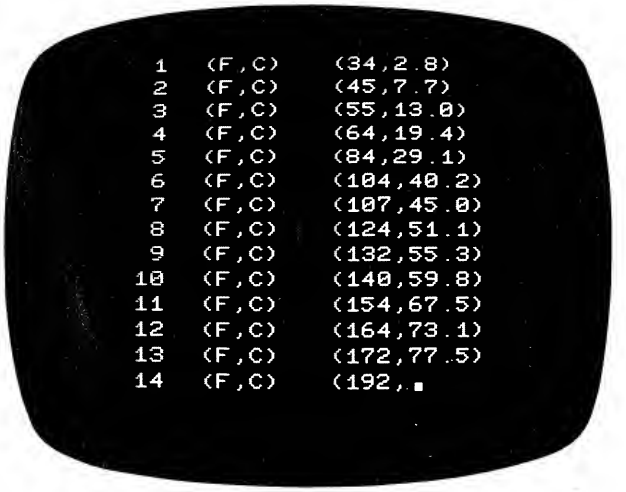
The program begins by offering a special timing option. If the student wishes, he or she can use the computer to time an experiment in minutes and seconds. Once an experiment has been performed and the data collected, the student can begin setting up to analyze the data. The computer will graph numeric data pairs consisting of an independent variable and a dependent variable. Students name their own variables, then type in the data pairs. Once all data pairs have been entered, the computer will display a full-screen graph of the data and will then make available a list of options for working with the graphed data.

Let's take a brief look at a few things the program can do. For example, let's see how the TRS-80 and the Graphical Analysis of Experimental Data program could be used to graph the relationship between the Fahrenheit and Celsius temperature scales. Suppose that you gradually heated a pan of ice on a stove, while taking simultaneous temperature readings with both a Fahrenheit and a Celsius thermometer. You recorded the following temperatures:

F	C
34	2.8
45	7.7
55	13.0
64	19.4
84	29.1
104	40.2
107	45.0
124	51.1
132	55.3
140	59.8
154	67.5
164	73.1
172	77.5
192	84.0

Your two variables for this example will be "F" for "Fahrenheit" and "C" for "Celsius." "F" will be your independent variable while "C" will be your dependent variable. When asked to name your independent variable, you'd type ⟨**F**⟩ and press ⟨**ENTER**⟩. When asked to name your dependent variable, you'd type ⟨**C**⟩ and press ⟨**ENTER**⟩.

An instruction screen with directions for entering your data pairs would then appear. Once you had read the instruction screen and pressed ⟨**ENTER**⟩, you'd see the screen on which data pairs are to be typed. When you had typed in part of your data, the screen would look like screen one.



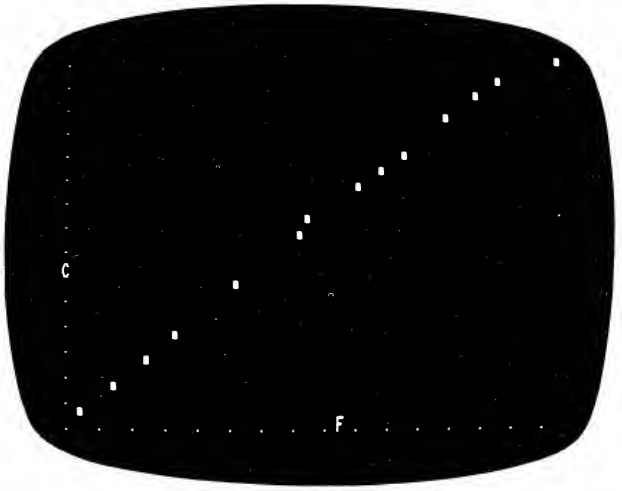
Screen 1

Once all data pairs were entered, a graph of all data points would appear as shown on screen two.

After studying the graph, you could press the space bar to see the list of options shown on screen three.

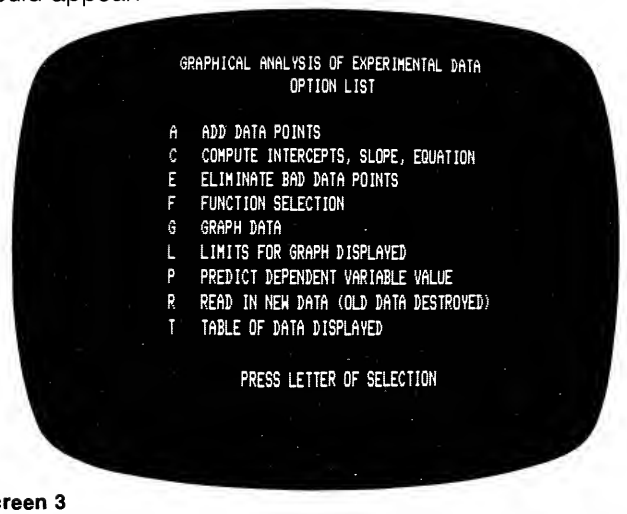
In analyzing the data in this particular example, you might want to begin by pressing ⟨**E**⟩ to eliminate the data points that did not fit with the smooth curve of the graph. Pressing ⟨**E**⟩ would make the graph reappear. Then, starting with the data point on the far left, each data point would in turn blink. To delete a data point you'd type ⟨**D**⟩ when the point

was blinking. To keep a data point you'd type ⟨K⟩ when the point was blinking.



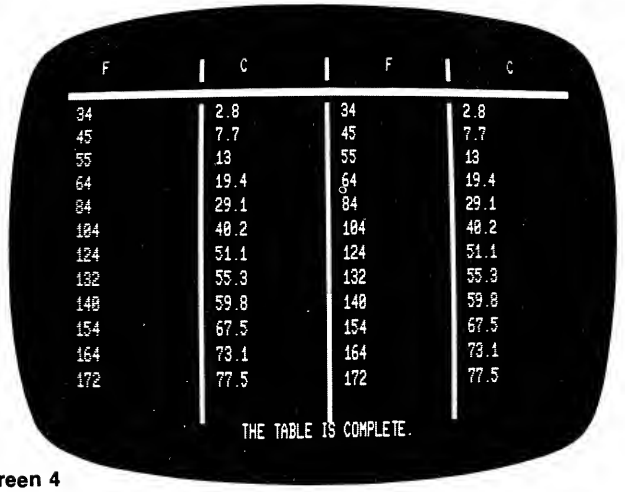
Screen 2

To see a table of the variable values that remained, you could press ⟨T⟩. A display like the one shown on screen four would appear.



Screen 3

If you next wanted to have the computer calculate and display the slope and intercepts of your graphed data, and the equation of the straight line of best fit to your data points, you'd press ⟨C⟩. You'd see a display like the one on screen five.



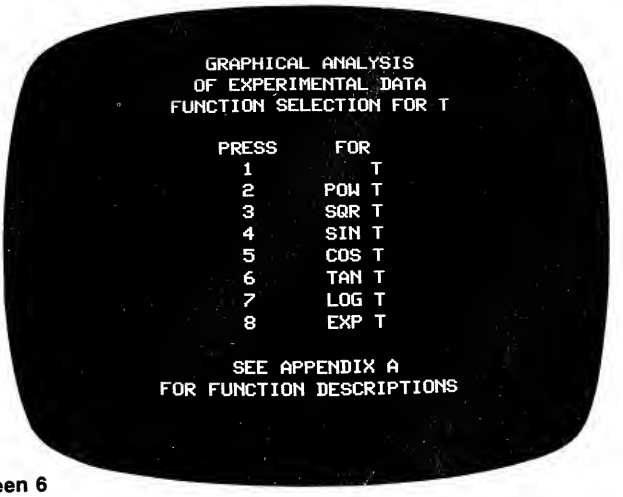
Screen 4

Once you had used the ⟨C⟩ option, you'd be able to use the ⟨P⟩ option to test the accuracy of the equation as a predictor of dependent variable values. To use this option, you'd press ⟨P⟩ and type in one or more independent variable values. As you typed each value, the computer would predict and display a dependent variable value based on your independent variable value.

If you were analyzing data from a different type of experiment, you might want to graph the functions of independent and dependent variables. Pressing ⟨F⟩ at the options list would allow you to choose a function for your variables (see screen six).

Screen 5

The user's manual for Graphical Analysis of Experimental Data contains a Selected Investigations section which provides numerous applications problems for high school physics. Typical problems present sample data from physics experiments based on frictional forces, Hooke's Law, Kepler's Law of Periods, Boyle's Law, and radioactive decay, among other concepts. Methods for analyzing the data on the computer are then suggested. A problem on U.S. Population Growth is included in the Selected Investigations section to suggest that many non-physics applications of the program are also possible. The population exercise provides population data from every Census taken from 1790 to 1970. The student is then asked to use the computer to plot population versus time, to plot the natural log of population versus



Screen 6

time, to eliminate particular data points, and then to use the prediction option of the program to project United States population for the years 2000 and 2025.

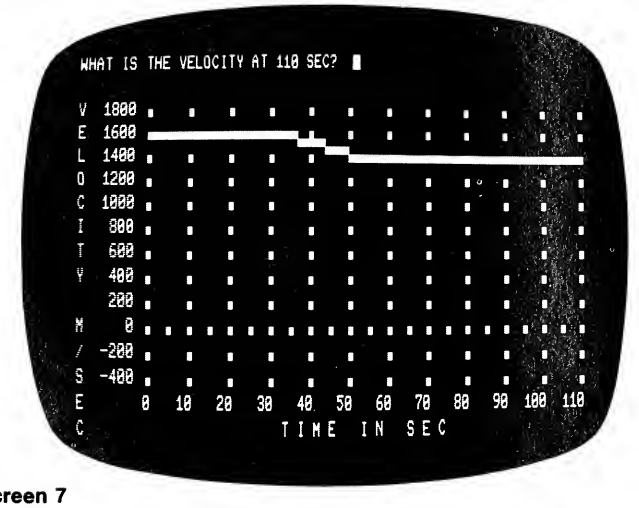
An Answer Key provided in the user's manual gives answers to all of the Selected Investigations problems. A Programming Guide also included in the manual outlines the structure of the Graphical Analysis of Experimental Data program.

INTERPRETING GRAPHS IN PHYSICS

Richard Born designed the Interpreting Graphs in Physics program to fill a gap that he felt was not being filled by the available textbooks for high school physics.

Graphing the way objects move in space is a typical activity for physics students, and Born observed that students' understanding of position and velocity versus time is greatly aided by a graph, but he felt that the textbooks available did not provide enough graphs. To supplement the textbooks, Born therefore designed Interpreting Graphs in Physics, a program that generates graphs for students and asks questions about the graphs.

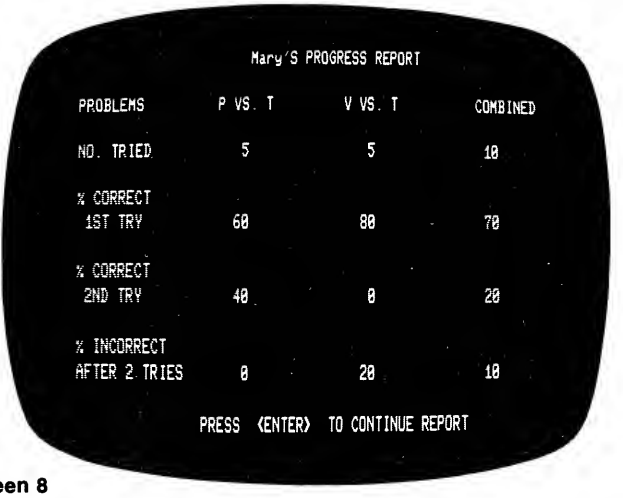
Once the Interpreting Graphs in Physics program is loaded and running, the computer presents two options. You can choose to work with a position versus time graph or a velocity versus time graph. If you type ⟨**P**⟩, the screen will display a position versus time graph. If you type ⟨**V**⟩, a velocity versus time graph like the one shown on screen seven will be displayed:



Screen 7

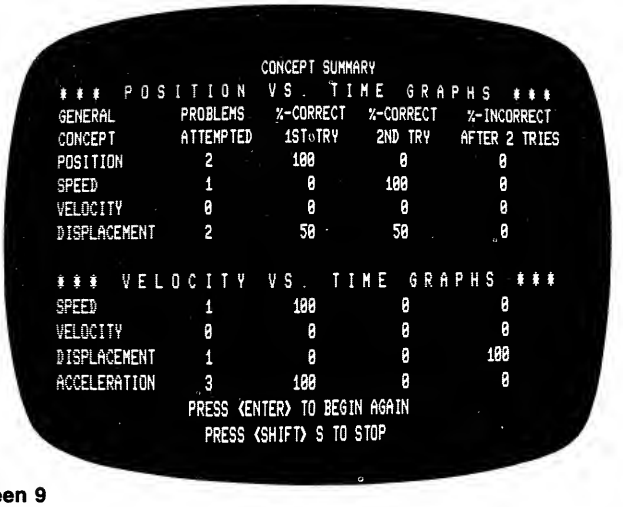
The computer will ask a series of five questions about the graph. For position graphs, these questions will be on position, speed, velocity, and displacement. You might, for example, be asked to identify the displacement of an object between two points in time. If you choose a velocity graph, you'll solve problems related to speed, velocity, displacement, and acceleration. For example, you might be asked to determine the average acceleration of an object between two points in time. Once you have answered five questions about a single graph, you'll be presented with a second option screen. Once again you'll have the option of requesting a position versus time graph or a velocity versus time graph. A third option—that of requesting a progress report—is also given. To see a report, you'd press ⟨**R**⟩. Screen eight is an example of a progress report for a student who worked with one position graph and one velocity graph.

At this point, you could press ⟨**ENTER**⟩ to make a more detailed second half of the report appear (see screen nine).



Screen 8

When you pressed ⟨**ENTER**⟩ again, you'd be returned to the beginning of the program, where you could again select a position graph or a velocity graph.



Screen 9

Graphical Analysis of Experimental Data (26-1722) and Interpreting Graphs in Physics (26-1721) can be used with a TRS-80 Model I or Model III 16K tape system or 32K or 48K disk system. The suggested retail price of Graphical Analysis of Experimental Data is $39.95, while Interpreting Graphs in Physics is listed at $29.95. Prices may vary at individual stores and dealers. For more information, contact your local Radio Shack Store or Computer Center.

The Southern New Jersey Computer Awareness Project

Glassboro State College
Glassboro, New Jersey 08028

The Southern New Jersey Computer Awareness Project (SNJCAP) provides summer and academic year follow-up for middle and secondary school teachers whose districts indicate a need for faculty training in the development and implementation of a computer-related curriculum. The goals of the project are to increase the computer literacy and skills of the teachers, and to increase the teachers' knowledge about the implementation, integration, and use of education computing.

The project grew out of a need discovered in a 1980 survey of fifty high schools in Southern New Jersey; less than half of the schools were using computers in their instructional programs. While economic resources were a part of the problem, a major reason was that of untrained and inexperienced faculty. With SNJCAP's inception at Glassboro State College, area teachers, principals, and superintendents expressed a need for and support of a project that would provide training in the development and use of computer based programs and materials. Dr. Francis Masat and Dr. Tom Osler of the mathematics and computer science department of Glassboro State College worked together to develop the program after finding that South Jersey school districts had continually fallen behind North Jersey schools in technological areas.

The project, in its proposal stages, had the support of the New Jersey Educational Improvement Center-South, the New Jersey State Department of Education, and the Superintendents of Camden, Gloucester, and Cumberland counties. Subsequently, it was funded in part by the National Science Foundation.

An integral part of the project is the summer immersion experience that uses teaching and subject-related problems in a classroom and microcomputer laboratory situation. For four weeks the project participants attend morning group sessions on computer programming, and afternoon lab sessions on computer use and educational applications. The teachers use the Mathematics and Computer Science Department's Microcomputer Laboratory which has several TRS-80 microcomputer systems. With the use of TRS-80 systems, the teachers learn the logical structure of a computer, the algorithmic formulation of problems, and BASIC.

Software, including that available through Radio Shack, is used and evaluated. Each day's assignment and homework in the highly-accelerated program represents one week's worth of course work during a normal semester. The teachers get a lot of hands-on experience with the department's TRS-80 microcomputers. The teachers also investigate recent research and development in microcomputers and computer science education, and write and present projects that deal with developing and implementing computer awareness and use. These projects normally involve curricular and administrative applications, grant writing, and strategies and procedures for implementing computer-based educational or administrative uses. Subsequently, the teachers prepare materials, projects, and curricula to use in their respective districts.

The thirty teachers presently in the program demonstrate the variety of uses that are beginning to occur in South Jersey schools. Although half of the teachers represent the fields of math and science, the other half come from such fields as business, gifted and talented, and compensatory education. But they all recognize the need for computer education for students of all ages and abilities.

The summer experience presents clear evidence that networks of microcomputers can offer more flexibility and output than large time-shared systems. Users do not compete for resources. If a CPU had failed, it would not have affected the other users. In fact, those teachers who had an opportunity to compare the department's time-sharing system with the microcomputer systems preferred the micros.

While the campus-based portion of the project happens during the summer, teachers, administrators and students return to the micro labs during the school year. The recent addition of a TRS-80 Network II has allowed many new and exciting applications to be developed. High school students and teachers have designed three-voice music programs, accounting and general ledger programs, CAI and Computer Managers Instruction (CMI) applications, and a variety of games complete with moving graphics.

To insure the project's goal of continued interest in computer education, site visits and roundtable discussions are used during the school year to keep in touch with teachers and find out how successful they have been in expanding or initiating interest in computer use in their districts. With the use of the TRS-80 microcomputers, the SNJCAP faculty and participants have helped to move many school districts into the computer age. Moreover, the impact is continuing and growing as the concepts, applications, and implications of microcomputers become part of the intellectual climate of the schools.

Model II SCRIPSIT 1.0 vs Model II SCRIPSIT 2.0

Or, What Does the Extra $100.00 Do for Me?

The following is a brief overview of the major differences between SCRIPSIT version 1.0 and 2.0.

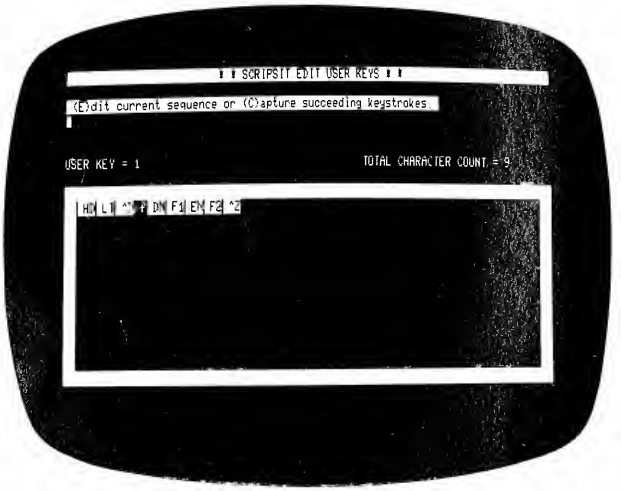
USER DEFINED KEYS

SCRIPSIT 1.0 has five different user keys, each with a maximum length of 32 characters. These keys have to be created through disk utilities and there is no provision for editing. If you make a mistake, you have to start over defining that key. One user key can be linked to other user keys.

In SCRIPSIT 2.0, you have access to 20 different user keys. These keys can be defined to carry out a sequence of instructions, to display text and to do any number of things.

One example is a user key which can be defined to move all of the text files from one SCRIPSIT diskette to another. This type operation requires commands to be issued both within a document and at the SCRIPSIT main menu level.

Each of SCRIPSIT 2.0's user keys can contain up to 255 keystrokes, and other user keys can be called, or the key can call itself to create a recursive routine.



SCRIPSIT 2.0's user keys can be defined at either the main menu Utility level or at the document level, giving you the ability to define keys quickly and easily at any time during a SCRIPSIT session. There are two basic methods of creating user keys. In the first method you tell SCRIPSIT to capture all following keystrokes (until a Control Z or 255 characters are received). This is probably the most straight-forward method since it allows you to see the action of the keys being captured while you are defining the key. The second method allows you to edit a previously defined key by inserting or deleting keystrokes.

SCRIPSIT 2.0 user keys can be edited from either the main utility or from your document. This lets you customize keys for particular documents.

PRINT FEATURES

SCRIPSIT 1.0 Special print codes are entered as a character (ex. '__') or as a control code sequence. Code sequences use the backslash and/or tilde. This causes a problem when the user wants to print one of these characters: __, |, \, and ~.

SCRIPSIT 2.0 print codes are entered as single characters and are displayed on the video using the Model II's graphic characters.

Printing special characters such as © and ™ in SCRIPSIT 1.0 requires patches to the program and is difficult for the operator to use.

In SCRIPSIT 2.0, the user can define up to 26 special printer control codes from the main utility menu. Each of the 26 special codes can have up to six ASCII codes to control printer functions. This gives you the ability to customize SCRIPSIT 2.0 to your particular printer, and use, if they are available, printer features like forward and reverse line feeds, multiple LPI (lines per inch) settings, or any other feature which your printer supports. You can also tell SCRIPSIT 2.0 how many (if any) of the characters in the printer control code are to be counted when justifying text that contains the defined character.

Line spacing in SCRIPSIT 1.0 can be set to 1-8 lines. In SCRIPSIT 2.0, you still use the digits 1-8, but they are now interpreted as:

1 - Single space, no blank lines
2 - Double space, 1 blank line
3 - Triple space, 2 blank lines
4 - 3 blank lines between each line printed.
5 - Half line spacing
6 - One and a half line spacing
7 - Two and a half line spacing
8 - Three and a half line spacing

Note that your printer must be capable of performing a half forward line feed for codes 5-8 to function.

BACKGROUND PRINTING

In SCRIPSIT 1.0, to print in the background (print one document while you are working on a different document), the desired document must be opened and then captured to a disk file through the print routine and then printed from the disk file. There is no printer control (such as stopping the printer and then continuing or printing a document on single sheets of paper).

In SCRIPSIT 2.0, you can type or edit one document while printing a second document. When printing begins, the Print Monitor gives you three choices:

1. If you want to perform another SCRIPSIT function while printing is in progress, you press ⟨**ESC**⟩ to return to the directory. Once the directory appears on the screen, you can open or create another document to work on while printing is in progress. There are a few functions which can not be done while printing is in progress (like diskette BACKUPs or document Merge) but this will not prevent you from doing most of the things you will want to do while in a document.
2. You can stop the printing process.
3. You can continue printing after it has stopped.

If you have chosen to use background printing, SCRIPSIT will alert you if the printer needs attention (such as at the end of a page, ribbon out, etc.) by flashing "PRINT MONITOR" at the bottom of the screen. You can then return to the Print function in the normal manner. SCRIPSIT 2.0 also gives you a special printer code, which you can put in the text of your document. This code tells the printer to stop and alert you. This can be used to change print wheels on the Daisy Wheel II for special effects, or for any other purpose you might have.

DIRECTORY FEATURES

In SCRIPSIT 1.0, ending a session is done through Disk Utilities using the Swap command. Exit to the operating system is not allowed. In SCRIPSIT 2.0, you are provided with an Exit option at the directory. After exiting you are given the choice of returning to SCRIPSIT, or exiting to TRSDOS.

SCRIPSIT 1.0 cursor movement on the directory screen is accomplished by use of the ⟨↑⟩, ⟨↓⟩, or ⟨**ENTER**⟩ keys. In SCRIPSIT 2.0 these functions are still available, but they have been augmented. Each displayed directory entry is numbered and you may move directly to that document by pressing the appropriate number.

Another new feature of the SCRIPSIT 2.0 directory is that new documents are placed at the beginning of the directory where they are easily found rather than at the bottom of the directory as with SCRIPSIT 1.0

BACKUP DISKETTE

In SCRIPSIT 1.0, the master diskette password was not required to backup a diskette. To better help you protect your information, the master diskette password is required in SCRIPSIT 2.0.

MERGE

In SCRIPSIT 1.0 print prompts cannot be changed prior to merge except through Change Disk Defaults. SCRIPSIT 2.0 gives you a print document screen which lets Print parameters be changed prior to merging text.

GET PAGE

By using the get page command in SCRIPSIT 1.0, the user can get the next page, the previous page, or a specified page by number. (CTRL G: N, P, or number). SCRIPSIT 2.0 adds two additional options, B for the Beginning page of the document, and E for the Ending page of the document.

PRINT THE SCREEN

This feature not available on version 1.0. In SCRIPSIT 2.0, the video screen can be printed at anytime by pressing ⟨**CTRL .**⟩ (Control period). This allows the user to get a hard copy of Print Control Codes, User Defined Keys, Help text, menus etc.

ESCAPE MENU

From an open document, pressing ⟨**ESC**⟩ in SCRIPSIT 1.0 displays a single menu on the bottom line. In SCRIPSIT 2.0, pressing ⟨**ESC**⟩ from an open document displays a menu that changes by pressing any key that is not an Escape Command.

RECALLING/SAVING FORMAT LINES

Format lines available for recall in SCRIPSIT 1.0 are 1 through 11 with no access to the default format line. When recalling a format line in SCRIPSIT 2.0, the choices are 1 through 11 or 'D' for default. If saving a format line, selection of 'D' will save the format as the new Create Document default.

ENHANCEMENTS

SCRIPSIT's speed has been greatly increased. This is most noticeable when going from disk to disk in the directory, and page to page in a document. Another place where the speed increase is noticeable is in document printing. If you wish to print only pages 41-49 of a 50 page document, SCRIPSIT 1.0 had to display each page until it got to page 41 and began printing. SCRIPSIT 2.0 scans through the skipped pages very rapidly (without displaying them) and begins printing the requested pages almost immediately.

SCRIPSIT 2.0 has a new "cascading" margin feature for creating outlined documents. Pressing ⟨**ESC**⟩ ⟨→⟩ or

⟨ESC⟩ ⟨←⟩ will reset the margins to the next tab position right or left respectively. A new paragraph will be started at the new position.

The system clock can be turned on or off from the directory. Also the current time can be printed on a document by enclosing a 'T' in braces - e.g. 00.25.09.

SCRIPSIT documents can be converted into ASCII text files and vice versa.

UPDATING FROM OLD TO NEW

In order to use a version 1.0 document in version 2.0, the 1.0 document must be copied onto the 2.0 diskette in drive 0 from the 1.0 diskette in drive 1. After the copy has been made, the new copy of the document must be reformatted before using. Document copies between new and old versions cannot be made in a one drive system. A user key sequence can be set up which makes the copying of documents easy and 'painless'.

SCRIPSIT DICTIONARY

SCRIPSIT 2.0 can be used with Radio Shack's new SCRIPSIT Spelling and Hyphenation Dictionary to save you time and increase the accuracy of your documents. The Dictionary program quickly checks your documents for spelling errors by comparing the words first to a Master List of over 100,000 words and then to a specialized User List (which you create for words not in the Master List). The program can also hyphenate your document, correctly dividing words between syllables.

The specialized User List enables you to personalize the program so that it will recognize words that are a part of your specialized vocabulary. This User List holds up to 2047 entries.

Statistical Analysis

W.W. Schumacher
KEMPER GROUP
3 Huntington Quadrangle
Melville, NY 11747

The Loss Control Engineering Department at KEMPER GROUP is currently studying staffing needs as they relate to our field inspection activities. As might be expected, a large amount of "number crunching" is involved with 19 branch staffs functioning nationwide

I have been looking at the methods and information available from our Home Office and branches in an attempt to confirm or deny the validity of both. Your Statistical Analysis package (Cat. #26-4540) for Model II has been most useful, however the correlation matrix program (CORRL/BAS - Version 2.5) contains several bugs, or perhaps oddities, that are most annoying, especially when printouts are sent to our people in Chicago or Syracuse. Since the problem is spelled out in the manual, but not noted as a bug, it appears to be intentional.

Please refer to the attached copy which states in part, "The variable numbers which appear on your output will be sequential (1 through the number of variables in the analysis) and are not related to those appearing on the file characteristics display."

This, in itself is odd, however, what is not stated is even more important.

The input routine asks how many variables are to be correlated (from 1 to 9) and then asks the user to input the variable numbers. This appears to be straight forward, but it is not!

In addition to using sequential numbers, as stated in the manual, the program uses sequential variable names. The result is that the output displays variable names and numbers that do not correspond to the data. Everything in the output is mislabeled, except in one specific case. The exception is the case where X variables are selected as variables 1 through X.

There is a fix and I cannot help but wonder why it was not included in the original program. Because of the manual comment, it seems the problem was intentional, but the logic escapes me.

In line 2115, the selected variables are input as a subscripted variable, WV%(J). Unfortunately, when the variables and variable names are printed in the PRINT and LPRINT routines, the variables are identified as "J" and the variable names are identified as "VN$(J)." The program will not and cannot print what was requested by the input statement.

The solution is simple, however, because of a lack of REMs, it took several hours to determine how the author set up the program. (Actually, the excessive time was spent trying to figure out why the method was intentional rather than accidental.)

The PRINT and LPRINT routines should be altered to print the Jth item of WV% rather then "J" and "VN$(J)." Four program lines need to be changed as follows:

3360 - Change J to WV%(J)
4030 - Change J to WV%(J)
Change VN$(J) to VN$(WV%(J))
5010 - Change J to WV%(J)
5110 - Change J to WV%(J)
Change VN$(J) to VN$(WV%(J))

I have enclosed a complete listing of the program with the changes incorporated and underlined in red. The variable "J" was not altered in the FOR:NEXT loops, rather, only in the PRINT (or LPRINT) statements.

No changes were required in the plotting routine starting at 9000, however users should be aware of a potential problem in 9000 and 9010. When asked which variables are to be plotted on the X and Y axis, the user must use the numbers of the variables as they appear on the screen rather than the sequential numbers previously generated in the program.

This is the way it would be logically expected, but after making the above changes, it may not be obvious that they would be reflected here without additional changes.

Had the original version printed out the proper variable names, I could have lived with the sequential numbering. The fact that output will be sent far and wide eliminates the possibility of co-existing with improper variable names. It would create too much confusion and require too many explanations.

I recommend that other users of this package be informed of this situation and the solution in the "Microcomputer News" as soon as possible. An errata sheet or reprinted page should be put in the manual at an early date, and future releases of the program should be upgraded.

Probably your software development people or another user can develop a solution more elegant than mine and if so, it should be put in the field as soon as possible.

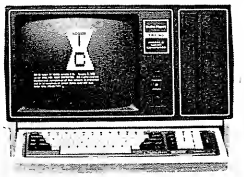
With the seemingly prompt bugs, errors, and fixes published routinely, I am somewhat surprised that I have seen no reference to this particular problem before. I do not think it would go uncommented for long by your astute audience.

From page 43 of the manual:

For each variable, the computer expects you to enter a variable number displayed on the screen. These numbers are used only for telling the computer exactly which variables it needs to read from disk. The variable numbers which will appear on your output will be sequential (1 through the number of variables in the analysis) and are not related to those appearing on the file characteristics display.

SUGGESTED PROGRAM CHANGES:

```
75 ' Version 2.5 - MODIFIED PRINT/LPRINT
     ROUTINES ON 5 NOVEMBER, 1981
336Ø PRINT "VAR. # ";
     : FOR J=1 TO NV
     : PRINT USING "########"; WV%(J);
     : NEXT J
     : PRINT
4Ø3Ø PRINT USING "######"; WV%(J);
     : PRINT TAB(21); VN$(WV%(J)); TAB(45);
5Ø1Ø LPRINT STRING$(79, "-")
     : LPRINT "VAR. # ";
     : FOR J=1 TO NV
     : LPRINT USING "########"; WV%(J);
     : NEXT J
     : LPRINT " "
511Ø FOR J=1 TO NV
     : LPRINT USING "######"; WV%(J);
     : LPRINT TAB(22); VN$(WV%(J)); TAB(45);
```



MODEL II Bugs, Errors and Fixes

ACCOUNTS PAYABLE (26-4505)

The Model II Accounts Payable program (26-4505 Version 1.0) will allow you to add more than one vendor with the same name, but will only process one of the vendor accounts. The following changes should be made to the program to prevent the addition of two or more vendors with the same name.

1. Backup the diskette(s) and make this change on the backup copy of the program.
2. In BASIC load the program by typing:
   `LOAD"APS/BAS" <ENTER>`
3. Add the following new line to the program:
   ```
   17Ø3 IF VV=NV THEN PRINT@(3,5Ø), R$ " ALREADY
      THERE " N$;: ER=1: GOSUB 169Ø: RETURN
   ```
4. Save the changes by typing:
   `SAVE"APS/BAS" <ENTER>`
5. At TRSDOS Ready, make a backup copy of the corrected diskette.

RSCOBOL (26-4703) and RUNCOBOL (26-4704)

When using variable length records in ISAM files, RSCOBOL always displays an ERROR 97 when a WRITE record is attempted. Following the ERROR 97, COBOL returns immediately to TRSDOS Ready. To correct this condition, use the following patches:

```
PATCH RUNCOBOL A=3EDD F=229B4A C=CDE26F
PATCH RUNCOBOL A=6FE2 F=ØØØØØØØØØØØØØØØØ
                      C=229B4A22934AC9
```

Also, when using variable length records, the "OCCURS DEPENDING ON" clause must not be specified at level 01. This is stated in the manual, but it is not obvious when reading casually.

Revisions, Enhancements, Etc.

The following is a list of current stock numbers for Computer Software revisions, enhancements and some miscellaneous items. These items can be ordered through your local Radio Shack store. If no price is shown, the item is available at no cost upon proof of purchase of the original program.

700-2014 Accounts Receivable (26-4504) Version 1.1 on TRSDOS 1.2a	N/C
700-2017 FORTRAN on TRSDOS 2.0a (26-4701)	N/C
700-2018 EDTASM on TRSDOS 2.0a (26-4702)	N/C
700-2024 Accounts Receivable (26-4504) on TRSDOS 2.0a	N/C
700-2111 Tandygraph disk for 26-1191 Multi-pen Plotter	N/C
700-3013 Profile II on TRSDOS 2.0a (26-4512)	N/C
700-3014 General Ledger (26-4501) on TRSDOS 2.0a	$15.00
700-3015 Payroll (26-4503) on TRSDOS 2.0a	$25.00
700-3016 Accounts Payable (26-4505) on TRSDOS 2.0a	$15.00
700-5001 Accounts Receivable Source Code for 26-4504 Version 1.1 on TRSDOS 1.2a	$299.00
700-6002 TRSDOS 2.0a Upgrade (26-4910) TRSDOS 2.0a Disk & Replacement pages for manual.	$24.95
700-6005 Scripsit 2.0 Upgrade (26-4531)	$100.00

Step-Saving Ideas

Time Calculation Algorithm and Saving Steps with the Pocket Computer

Leonard M. Levine
10 Fifth Avenue
New York, NY 10011

As my first contribution to Microcomputer News, may I suggest the following:

In RUN or DEFINE mode, key:

T=Ø,T=DEG +Ø.ØØ+T,DMS T

Now hit ⟨**ENTER**⟩ to set T (time) to zero. Hit ⟨→⟩ or ⟨←⟩ to retrieve the formula and hit ⟨**SPC**⟩ four times to remove the initialization of T from this (recursive) time-calculation algorithm. Now hit ⟨→⟩ four times and you are ready to enter minutes, to the left of the decimal point and seconds to the right! Try this for summing cuts on a phonograph record for tape recording appointments or phone calls, etc. The first "+" may be changed to a minus or, for simplicity, eliminated. In RESERVE mode it uses 18 steps and will not take up even one of the 1424 PROGRAM steps!

SO LITTLE TIME, SO MUCH TO SAY . . .

1. Thanks for the PC (I call it that with great affection and no little respect) and thanks also for the Microcomputer News.
2. I bought the PC in January, 1981 but just learned of the Microcomputer News. The May, 1981 Pocket Computer Product Line Manager's News is very meaty; I am still digesting the meal!

SOME FURTHER FOOD FOR THOUGHT—

3. Key in:

```
95ØPRINT"THIS IS A TEST OF THE":PA.QI. <ENTER>
```

Now cursor over to the Q and key a " over it. Next cursor to the end (I use EOL to mean "end-of-line") and add the rest of the line (as on page 21 of the May MN). Now RUN the line (RUN or DEF mode); note that there are 14 spaces left to key on line 950 (6 more!); RUN it again (you will probably want to change the PAUSE to a PRINT by now); note that it takes up only 65 bytes (including the 3-byte overhead) out of the 1424; RUN . . .

That is right! The characters [INPUT] appear on the instruction line and the execution PRINT line but take up only 1 (one) of the 79 positions on the instruction line and only 1 of the 1424 MEMory steps! To paraphrase an old bromide, for the PC more than any other computer, "A step saved is a step earned."

Of course this works just as well for BEEP , RETURN , DEGREE , NEXT, LIST, END , LOG and all the others, many of which are useful in string constants or variables(!) as part of INPUT, PAUSE, PRINT statements or even as labels. Each use saves from three to six bytes of MEMory. There is more to it; play with it and see. For example, key:

```
3ØØC$=QI.
31ØA$=QN.P.L.
32ØP.C$;A$
```

Now replace the Q's with "s, note the MEMory savings and RUN. Also try:

```
2ØØG.QC.
21ØP."FAIL
22ØQC.Q B.2:P."OKAY!
```

Replace the three Q's as above and watch it RUN. (I usually omit quotes, at EOL only—"A step saved is . . . " There are cautions to be observed here also. Play with it.)

4. While we are on the subject of step-saving, see what happens when the line at the top of the second column (same issue, same page) is changed to:

```
1ØØ: X=(B>Ø) + (C>Ø:IF X=1 BEEP2
```

A step saved . . . Even within a multiple assignment, e.g.:

```
555: A=INT (B * (C + D, E=F * (COS (G + H * (J + 2π , K=....
```

the PC closes up all pending right parens for you! In calculator mode, too. A step . . . , well, you get the idea by now.

Editor's Note: While PC-1 will close pending right parens as indicated, our programmers warn against the practice. To paraphrase one programmer, the PC may ambush the user if this is tried.

5. Still speaking of "anti-inflationary" programming, the PC manual does mention (bottom of page 51) the kind of LET statement I used above but the GAMES I Package, Cat. No. 26-3515, uses colons instead of commas. Commas cost nothing extra and their use does save about three milliseconds per assignment; in some programs this adds up to real savings (I am as sick of that old saw "a second saved . . . " as you are by now).

For instance, the PC will solve the time honored mathematical problem posed by British mathematician G.H. Hardy: find the smallest integer expressible as the sum of two cubes in two different ways (answer: if N=X^3 + Y^3 Then N=1729, X(1)=1, Y(1)=12; X(2)=9, Y(2)=10). However, it sits there thinking for an hour and forty minutes before beeping happily and displaying the right answer. This is about an hour and thirty-nine minutes more than the Color Computer requires and an hour and an forty minutes more than a large-scale IBM, so every millisecond counts!

I would love to see a faster PC solution from a Microcomputer News reader, or any solution for that matter. It is not easy. I will send you my program and other programs of more practical value just as soon as I can get, or get at, one of those PC printers I have been hearing about.

6. Really enjoyed that Games I Package. Gave my dealer a correction to the Star Blaster program and write-up which he sent to One Tandy Center in March. No word yet. "The mills of the gods . . . "? Here it is again, and one for Missionaries and Cannibals (not the one mentioned on the error-insert 875-9068 that came with the Package):

Star Blaster, page 17, "Change Pattern" chart, center-left section should be: and line 110 should be changed so the "U=2.7" reads "U=1.7"

Missionaries: line 165 is missing a quote after "BOAT STOLEN".

7. Back to the May column. Some readers may still be confused by your example showing that " . . . the line number takes up exactly as many steps as there are digits." When line 950 is edited so that the line number is 95 you do get another position on the line. You do not get another byte (step) of MEMory, i.e. one of the 1424. Every line, regardless of the number of digits in the line number, uses three steps (bytes) of MEMory before you have keyed in the first character following the line number. Two of those steps are for the line number itself and the other, though the manual does not say it in so many words, represents EOL when ⟨**ENTER**⟩ is keyed. A very minor point - the program in the second column will run just as well without line 110. I know it is an illustration; please pardon the proofreader in me.

Multiple Linear Regression

Garland Bryant
Kirkland, Washington

On March 1st, 1981, I purchased the Pocket Computer and Recorder. I will share with you and the readers one of my more useful programs. Using standard text book statistics (Multiple Linear Regression), it provides an and/or choice of a 2nd or 3rd order polynomial curve-fit for a two dimensional data array, i.e., one dependent and one independent variable. The notation is:

$\hat{Y} = A + B1X + B2X^2$

or

$\hat{Y} = A + B1X + B2X^2 + B3X^3$

where $\hat{Y}$ (Y hat) is the statisticians symbol for "best value".

In the program listing, line 10 is for data entry and lines 140 and 150 store the cumulative sums of squares. Notice that I've added line 139 to provide data print-out, but it is a nuisance when the program is being run without the printer. My only solution to this is to change GOTO 139 in line 10 to GOTO 140 when the printer is not being used. Any comments? Lines 20 through 100 calculate the residual sum of squares, the statistical parameters and the constants and coefficients for the 3rd order polynomial. Lines 160 and 170 calculate the same for the 2nd order fit. Lines 110 and 115 and lines 180 and 185 print out the program results. R squared is the square of the correlation coefficient (unadjusted). A value of 1.000 . . . indicates a perfect fit; a value of zero, no connection between X and Y.

"S" is the residual standard deviation. It is an interval in a plus or minus sense about the mean line (our calculated curve) which contains 68% of the data points. Lines 120 and 190 permit numerical evaluation of the polynomial. Do not enter values of X outside the range of the data. This is an unreliable extrapolation of the data. Any combination of plus and minus values may be used as input data. One must use a minimum of four data pairs for the 2nd order polynomial and five for the 3rd order polynomial. There is no limit to the number of data points except register capacity. Lines 130 and 200 show how to recall curve data if desired. This is not necessary with the printer. Lines 132 and 205 allow selection of the other polynomial (if desired) without re-entering the data.

As an example I have chosen eight data pairs taken from an aircraft engine test stand. The smaller of the numbers is EPR, the power setting parameter and the larger, the gross thrust of the engine. R2 (R squared) is .9999 which signifies very highly correlated data. (It should be—we are dealing with a machine.) The standard deviation is 14 lbs. Degrees of freedom are 5. This is the number of data points minus the number of constants in the fitted curve—in this case three: A, B1 and B2. In the program, this number is used as a divisor which explains the minimum number of data points.

From previous experience with the rather complex test facility, I know that S should be 15. A value of 20 is acceptable but I'm not overly enthused. If I see a value of, say 30, I'm jumping up and down and screaming. The appropriate experts must comb the system.

The Pocket Computer is 100% dedicated to me and I can make these computations quickly without dependence on telephone lines or the big computer expert (it's two o'clock Saturday morning and he's away on a camping trip 200 miles away and the other one is on sick leave.)

I have also run a third order fit here. It can be seen from the deterioration of R2 (S has gone completely to pot) that the 3rd order fit is just not the one to use on this particular data. Of course, in the general case, it's quite possible that neither the 2nd or 3rd order fit will produce a satisfactory fit for a given purpose.

THE EXAMPLE (2nd ORDER)

```
NEW DATA
X=?   1.229
Y=?   3892.
X=?   1.298
Y=?   4992.
X=?   1.327
Y=?   5422.
X=?   1.407
Y=?   6654.
X=?   1.551
Y=?   8752.
X=?   1.23
Y=?   3941.
X=?   1.299
Y=?   5020.
X=?   1.327
Y=?   5438.
```

```
<BREAK>
RUN 20 <ENTER>

2ND OR 3RD POLY?(2OR3) 2<ENTER>

R SQD= 9.999417804E-01
S= 14.2421782
DF= 5.
A= -19329.07277
B1= 21974.23452
B2= -2494.470727
X=1.229
Y HAT= 3909.510596
X=1.298
Y HAT= 4990.789378
X=1.327
Y HAT= 5438.150595
X=1.407
Y HAT= 6650.498719
X=1.551
Y HAT= 8752.263695
X=1.23
Y HAT= 3925.350927
X=1.299
Y HAT= 5006.285472
X=1.327
Y HAT= 5438.150595
RUN180 FOR CURVE DATA
RUN 32 FOR OTHER POLY

RUN 32 <ENTER>

2ND OR 3RD POLY?(2OR3) 3<ENTER>

R SQD= 9.913099265E-01
S= 194.5398198
DF= 4.
A= -19801.07329
B1= 23246.75325
B2= -3506.493506
B3= 242.4242424
```

THE PROGRAM

```
1 "NEW DATA"
     : CLEAR
2 PAUSE "NEW DATA"
1Ø INPUT "X=?"; X, "Y=?"; Y
     : GOTO 139
2Ø M=C-BB/A
     : O=E-CC/A
     : Q=G-DD/A
     : P=F-CD/A
     : A(36)=E-BD/A
3Ø N=D-BC/A
     : W=J-BH/A
     : Z=K-CH/A
     : A(27)=L-DH/A
     : U=I-HH/A
32 INPUT "2ND OR 3RD POLY?(2OR3)"; A(37)
33 IF A(37)=2 GOTO 16Ø
4Ø A(28)=MOQ+ 2NPA(36)- (A(36)A(36)O+ PPM+ QNN
5Ø A(29)=(WOQ+ ZPA(36) +A(27)NP- (A(27)A(36)O+
    PPW+ QNZ))/ A(28)
6Ø A(3Ø)=(MZQ+ NA(27)A(36)+ WPA(36)-
    (A(36)A(36)Z+ A(27)PM+ NWQ))/ A(28)
7Ø A(31)=(MOA(27)+ NPW+ A(36)ZN- (A(36)OW+ PZM+
    A(27)NN))/ A(28)
8Ø A(32)=H/ A- A(29)B/ A- A(3Ø)C/ A- A(31)D/ A
     : A(33)=A-4
9Ø A(35)=U- (A(29)W+ A(3Ø)Z+ A(31)A(27))
95 R=1- (A(35)/ U)
1ØØ S=  (A(35)/ A(33))
11Ø PRINT "R SQD= "; R
     : PRINT "S= "; S
     : PRINT "DF= "; A(33)
     : PRINT "A= "; A(32)
115 PRINT "B1= "; A(29)
     : PRINT "B2= "; A(3Ø)
     : PRINT "B3= "; A(31)
12Ø INPUT "X=?"; V
     : PRINT "X="; V
     : A(34)=A(32)+ A(29)V+ A(3Ø)VV+ A(31)VVV
     : PRINT "Y HAT="; A(34)
     : GOTO 12Ø
13Ø PRINT "RUN 11Ø FOR CURVE DATA"
132 PRINT "RUN 32 FOR OTHER POLY"
     : STOP
135 GOTO 1
139 PRINT X, Y
14Ø A=A+1
     : B=B+ X
     : C=C+ XX
     : D=D+ XXX
     : E=E+ XXXX
     : F=F+ XXXXX
     : G=G+ XXXXXX
15Ø H=H+Y
     : I=I+ YY
     : J=J+ XY
     : K=K+ XXY
     : L=L+ XXXY
     : GOTO 1Ø
16Ø A(28)=MO- NN
     : A(29)=(WO- NZ)/ A(28)
     : A(3Ø)=(MZ- NW)/ A(28)
165 A(32)=H/ A- A(29)B/ A- A(3Ø)C/ A
17Ø R=1- ((U- (A(29)W+ A(3Ø)Z))/ U)
     : A(33)=A- 3
     : S=  ((U- (A(29)W+ A(3Ø)Z))/ A(33)
18Ø PRINT "R SQD= "; R
     : PRINT "S= "; S
     : PRINT "DF= "; A(33)
     : PRINT "A= "; A(32)
185 PRINT "B1= "; A(29)
     : PRINT "B2= "; A(3Ø)
19Ø INPUT "X=?"; V
     : PRINT "X="; V
     : A(34)=A(32)+ A(29)V+ A(3Ø)VV
     : PRINT "Y HAT="; A(34)
     : GOTO 19Ø
2ØØ PRINT "RUN18Ø FOR CURVE DATA"
2Ø5 PRINT "RUN 32 FOR OTHER POLY"
     : STOP
21Ø GOTO 1
```

Pocket Computer Bugs, Errors and Fixes

Revisions, Enhancements, Etc.

The following is the stock number for a Pocket Computer Software revision. This item can be ordered through your local Radio Shack store and is available at no cost upon proof of purchase of the original program.

700-2400 Real Estate Tape 2 (26-3510 Ver 1.1) N/C
Corrects part B of REAL4 where the total amortization was not including the first month's payment.

Compound Miters

Bruce Taub
75 Captains Road
North Woodmere, NY 11581

I happen to own a Texas Instruments TI-58, and a Radio Shack TRS-80 Pocket Computer. I enjoy using the PC 100% more than the TI-58. The PC is compact, has varied programs, constant memory (even when the unit is off), and is reasonably priced.

Recently I created a program for the PC to cut down the calculating time in any wood-working shop where you have to calculate saw angles for compound miters. All the angles are printed in degrees. If you are using a table saw, substitute the miter angle for the arm angle.

PROGRAM DESCRIPTION

SHFT A—The PC takes the amount of sides and finds the number of degrees of the interior angle. The PC then calculates the tangent of the interior angle. Using another variable, the PC converts the tangent of the interior angle to the cotangent. The PC calculates the sine of the slope and multiplies this with the cotangent. The arctangent of the result is the ARM ANGLE.

SHFT B—The PC takes the amount of sides and finds the number of degrees in the interior angle. The PC then calculates the cosine of the interior angle. Once the slope angle is inputted the PC finds its cosine. After these two variables are multiplied together, the PC takes the arcsine of the answer and gives you the TILT ANGLE.

I hope that this program is as helpful to you as it is to me!

Good-luck and happy computing.

THE PROGRAM

```
5:PAUSE "SAW ANGLE SETTINGS FOR:"
     : PAUSE "    COMPOUND MITERS"
1Ø:"Z" PAUSE "ARM ANGLE       - SHFT A"
2Ø:PAUSE "BLADE TILT ANGLE- SHFT B"
25:PAUSE "END PROGRAM     - SHFT K"
     : END
3Ø:"A"INPUT "# OF SIDES? "; N
     : A=9Ø-18Ø/N
4Ø:B=TAN A
5Ø:C=1/B
6Ø:INPUT "SLOPE ANGLE? "; S
7Ø:D=SIN S
8Ø:J=C*D
9Ø:Z=ATN J
     : H=Z
     : M=(H-INT (H))
     : IF M>.55 LET Z=Z+.Ø5
1ØØ:PAUSE "THE ARM ANGLE IS"
     : PRINT USING "###.#"; Z
     : GOTO 1Ø
11Ø:"B"INPUT "# OF SIDES? "; N
     : A=9Ø-18Ø/N
12Ø:F=COS A
13Ø:INPUT "SLOPE ANGLE? "; X
     : Y=COS X
14Ø:O=F*Y
15Ø:Q=ASN O
     : H=Q
     : M=(H-INT (H))
     : IF M>.55 LET Q=Q+.Ø5
16Ø:PAUSE "THE TILT ANGLE IS "
     : PRINT USING "###.#"; Q
     : GOTO 1Ø
21Ø:"K"IF V=Ø PAUSE ">END "
     : END
```

Pythagoras' Theorem

Joseph Strolin
21 Ellen Street
Norwalk, CT 06851

Enclosed find a simple little program I wrote for the TRS-80 Pocket Computer. Use it any way you wish. It makes a nice small program with graphics!

```
1Ø:PRINT "PYTHAGORAS,"
2Ø:PRINT "THEOREM"
3Ø:PRINT "BY JOE STROLIN"
4Ø:PRINT "        *"
5Ø:PRINT "       **"
6Ø:PRINT "      * *"
7Ø:PRINT "C=?  *  *"
8Ø:PRINT "    *   * B"
9Ø:PRINT "   *    *"
1ØØ:PRINT "  *     *"
11Ø:PRINT " *      *"
12Ø:PRINT "*********"
13Ø:PRINT "    A"
14Ø:PRINT "SIDE A=?"
15Ø:INPUT H
16Ø:PRINT "SIDE B=?"
17Ø:INPUT I
18Ø:J= √(H*H+I*I)
19Ø:PRINT " "
2ØØ:PRINT "SIDE A="; H
21Ø:PRINT "SIDE B="; I
22Ø:PRINT "SIDE C="; J
23Ø:PRINT " "
24Ø:PRINT " "
25Ø:END
```

Cub Scout Song

Jules L. Schafer
3314 Cottman Avenue
Philadelphia, Penna. 19149

This program is dedicated to all former and present Cub Scouts, their Parents, Den Leaders, and Pack Masters. It is sure to make the parents and Cub Leaders groan as they recall hearing this song, line by line, from 100 bottles down to one and then back up to 100.

It may be of interest to note that the program works, repeating from 100 down to one and back up to one hundred again with TWO FOR statements, but only ONE NEXT statement. It may also be of aid for those who are awed by computers: You can make the computer do what you want, for as long as you want, no matter how silly what you make it do is.

```
1Ø FOR A=1ØØ TO 1 STEP -1
2Ø PAUSE A; "BOTTLES OF BEER"
3Ø PAUSE "ON THE WALL"
4Ø PAUSE A; "BOTTLES OF BEER"
5Ø PAUSE "ON THE WALL"
6Ø PAUSE A; "BOTTLES OF BEER"
7Ø PAUSE "TAKE ONE DOWN"
8Ø PAUSE "PASS IT AROUND"
9Ø NEXT A
1ØØ FOR A=1 TO 1ØØ
11Ø GOTO 2Ø
```

Questions and Answers

This month I will continue answering some of the more frequently asked questions that we receive.

Question: "How can I figure out the addresses of a machine language program so that it can be saved to disk and tape?"

Answer: First, I assume you are trying to duplicate a program for BACKUP and archival purposes, and not for unauthorized distribution of copyrighted material.

Memory locations &H01DA to &H01E1 contain the name of your program loaded from tape. Memory locations &H01E5 to &H01E6 contain the EXECute address. Memory locations &H01E7 to &H01E8 contain the load or START address. All that is left for you to determine is the length of the program (or the ENDing address). To figure out what the proper values are, PEEK the locations (don't forget the "&H" in front of the numbers). The values returned are in decimal. You will need to convert the name to ASCII values using the CHR$() function of standard BASIC. The START and EXECute address can be used in either decimal or converted to hexadecimal. If you are unsure of how large the program is, simply dump from the START address to the end of memory.

ADDRESS	CONTENTS
&H01DA-&H01E1	Eight Character Program Name (padded on right with spaces)
&H01E5, &H01E6	EXEC ADDRESS (MSB, LSB)
&H01E7, &H01E8	START ADDRESS (MSB, LSB)

This method will work with "normal" programs. If the program was written to defeat duplication (sometimes they do that you know), the programmer may have done something strange in ROM or in low RAM and you may not be able to duplicate the material without a lot of work figuring out what the programmer did.

Note: **Unless you write your own driver routine, you will need Extended BASIC to CSAVEM a machine language program on tape.**

One other thing to remember: If the program you are loading is on tape and you're going to save it to disk, you may need to offset the three addresses (Start, End, Execute) by about 2050 bytes so the program does not get garbled with the disk buffer.

Question: "How do you handle files on a micro system?"

Answer: Depending on whether you are using tape or a disk system as the storage medium, you have a choice of either Random (Direct) Access or Sequential Access Files. Tape storage offers only sequential files, while disk storage offers either or both. I have found that manipulating data in memory is a lot faster than doing it on a storage medium, but you usually run out of memory before you are finished. With the disk system, I have found that using a random file with a sequential index file (see next question) is the fastest, most economical method for my purposes.

Question: "How might a disk mailing list which prints out labels be set up?"

Answer: There are many different ways this could be accomplished. The following should get you started towards creating a disk mailing list. The easiest method I've found to manipulate data is by using Random Access Files (also called Direct Access Files). I also want to sort quickly, so I also have a sequential file which I keep in-memory. To start, I determine the various fields (e.g. name, address, city/state, zip, phone number.) Since writing small programs is easier than writing long, involved programs, write each function (add, delete, update, print) as a separate module. When all modules are completed, you can write a short Menu program to select the one you need.

The "add" module would simply display the various fields involved, allow input to each one of the fields, and then create one large string from the various data input and write this string to a file on the disk. The "print" function could be done much the same way, by loading in the long string and then breaking it down to the various fields involved. You can then select the information you want printed, format the manner in which you want it printed, etc.

The "update" module tends to be a little more tricky. Using the MID$ function, you can replace data in the middle of a string without affecting the surrounding data. Each field must remain the same length. However, once you have set up the "add" module, the update module can use many of the program lines, input routines, field formats, etc.

The next major step is to decide which fields are to be used for sorting. Using a sequential file, you read the record number and the portion of the string which is going to be used for sorting (like name or zip). Using a two dimension array, you can sort the field you've selected and save it in another file, saving both the field and the corresponding record number. (This enables you to go directly to the record in the random file.) Each time you load a module, you will load this sequential file and store it in memory. Whenever you want to find a specific record, a simple FOR-NEXT loop will go through the array in memory, find the related record number, open the file and get the information. Sound confusing? Well, take it one module at a time. Be sure each module is debugged before proceeding with the next module. Use the disk for storing and retrieving the modules, as memory can be limited depending on the amount of information you want to save in each record.

Question: "How do I set up cassette files to migrate to disk if I ever want to ?"

Answer: This is not a problem with the Color Computer Disk system. The syntax (or sentence structure) for writing data to tape is almost the same as writing sequential data to the disk. Instead of OPENing device #-1, you OPEN device #1. To convert your existing data files to disk, simply read them as you would normally, then write them out to disk changing the OPEN statement and the PRINT # statement.

After you have created your disk data file, change the OPEN statement and INPUT # statement to read from disk instead of tape. Remember we said that the Color Disk was "transparent" to the user, and that is what we meant! The only difference in creating/maintaining disk files as opposed to tape files is the device you specify when you open the buffer to the device. (-1 for tape, and 1 for disk.)

Hopefully these questions and answers have been of use to you. There are more in the works. (The questions come faster than the answers).

Color Computer and Videotex Bugs, Errors and Fixes

Revisions, Enhancements, Etc.

The following is a list of current stock numbers for Computer Software revisions, enhancements and some miscellaneous items. These items can be ordered through your local Radio Shack store. If no price is shown, the item is available at no cost upon proof of purchase of the original program.

COLOR COMPUTER

700-2013 8 Bit Printer Driver for CC N/C
(LP VII, VIII) Driver which allows dot addressable graphic operation of LP VII and VIII. This program is needed by owners of the Color Computer with the standard 1.0 ROM only. (NOT required to operate 26-3021, Screen Print Program.)

700-2113 Tandygraph disk for 26-1191 N/C
Multi-pen Plotter

VIDEOTEX

700-2300 Dow Jones Service for any Videotex. N/C
This software is for Videotex owners whose Videotex packages did not contain the Dow Jones Service.

Merge Cassette Programs

Jorge Mir
12851 W. Balboa Dr.
Berlin, Wis. 53151

Here is a simple way to merge BASIC programs for the Color Computer.

1. Type PCLEAR 1 to clear as much memory as possible.
2. CLOAD the first program into memory.
3. RENUM the program to conserve space and to lower size of the largest line number. Be sure to write down the largest line number in the newly renumbered program. I use RENUM 100,,1 (don't forget the two commas.)
4. Make a note of where the first BASIC program begins by writing down the values from:

   ```
   PRINT PEEK(25), PEEK(26) <ENTER>
   ```

   The values for a typical program will be 12 and 1.
5. Change the BASIC beginning of program pointers to the end of the first program by typing:

   ```
   A=PEEK(31): POKE 25, A <ENTER>
   A=PEEK(32)-2: POKE 26, A <ENTER>
   ```
6. CLOAD the second program into memory.
7. RENUM the second program, making sure that the starting line number for the second program is larger than the ending number you wrote down for the first program in step 3. Use:

   ```
   RENUM xxx,,1 <ENTER>
   ```

   (where xxx is the new starting line number for the second program.)
8. Change the BASIC beginning of program pointer back to its original value (the values you wrote down in step 4.) If the values were 12 and 1, the command sequence would be:

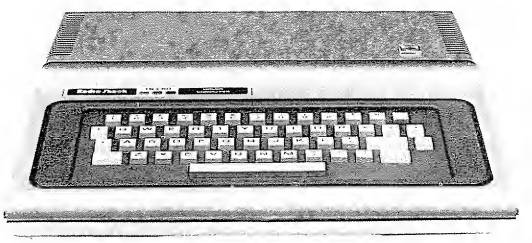
   ```
   POKE 25, 12: POKE 26, 1 <ENTER>
   ```
9. You are now ready to RUN, LIST, CSAVE, etc. the program.

Here are some hints or comments to help you with merging programs:

- The first step in each of the merged programs should be a CLEAR xxx statement to clear memory and reset any DIM statements you may have used in the earlier sections. (If you are merging a series of subroutines into one larger program, disregard this hint.)
- If you are using DATA statements in more than one section of the merged programs, you will have to check the order in which they are read to avoid conflicts.
- I use program steps 1-99 in the final program as a menu to get into the various merged programs.
- End each of the individual programs with a GOTO 1 statement so you can get back to the menu after running each section.
- If more than two programs are being merged, repeat steps 5-7 until the last program has been merged, then go on to step 8.

I have been using this merging technique for a while and it works very well.

Merging helps in reducing the number of tapes I use, and helps to eliminate hunting for various programs within a tape. One drawback to merging several programs and tying them together with a menu is that programs will, of course, be longer and it takes more time to load them into the computer. However, if you organize the merging process properly, you can merge into similar programs together, or programs which are used together can be merged.



Printer Calendar

Harry Stern
189 NE Sierra Drive
Miami, FL 33179

The programs for the Color Computer in the December Microcomputer News were great. But I do not want any of my fellow owners of color computers and Line Printer VIIs to be jealous because they do not have a calendar program like the one for Model III.

NOW THEY HAVE!

```
5 CLS
     : PRINT " PROGRAM TO PRINT CALENDAR FOR ANY
     MONTH FROM MARCH, 17ØØ TO FEBRUARY 21ØØ"
     : PRINT
1Ø INPUT "MONTH<EXAMPLE JAN=1>, YEAR"; M, Y
2Ø IF M<1 OR M>12 THEN 1Ø
3Ø GOSUB 1ØØØ
4Ø IF M=1 THEN M$=" JANUARY"
     : L=31
5Ø IF M=2 THEN M$=" FEBRUARY"
     : L=28
     : IF Y/4=INT(Y/4) THEN L=29
     : IF (YR/1ØØ=INT(YR/1ØØ)) AND (YR/4ØØ<>
     INT(YR/4ØØ)) THEN L=28
6Ø IF M=3 THEN M$="  MARCH"
     : L=31
7Ø IF M=4 THEN M$="  APRIL"
     : L=3Ø
8Ø IF M=5 THEN M$="   MAY"
     : L=31
9Ø IF M=6 THEN M$="   JUNE"
     : L=3Ø
1ØØ IF M=7 THEN M$="   JULY"
     : L=31
11Ø IF M=8 THEN M$="  AUGUST"
     : L=31
12Ø IF M=9 THEN M$="SEPTEMBER"
     : L=3Ø
13Ø IF M=1Ø THEN M$=" OCTOBER"
     : L=31
14Ø IF M=11 THEN M$=" NOVEMBER"
     : L=3Ø
15Ø IF M=12 THEN M$=" DECEMBER"
     : L=31
16Ø UL$=STRING$(4Ø, "-")
17Ø PRINT #-2, CHR$(31); CHR$(16); "Ø5"; M$; Y;
     CHR$(3Ø)
18Ø PRINT #-2, UL$
19Ø PRINT#-2, CHR$(16); "Ø1"; "SU"; CHR$(16); "Ø7";
     "MO"; CHR$(16); "13"; "TU"; CHR$(16); "19";
     "WE"; CHR$(16); "25"; "TH"; CHR$(16); "31";
     "FR"; CHR$(16); "37"; "SA"
2ØØ PRINT#-2, CHR$(13)
21Ø FOR D=1 TO L
22Ø BL=N+D-1
23Ø BL=BL-INT(BL/7)*7
24Ø BL=BL*6
25Ø IF D<1Ø THEN BL=BL+1
26Ø D$=RIGHT$(STR$(BL), 2)
27Ø IF BL<12 THEN D$="Ø"+RIGHT$(STR$(BL), 1)
28Ø PRINT#-2, CHR$(16); D$; D;
29Ø IF BL>35 THEN PRINT#-2, CHR$(13); CHR$(13)
3ØØ NEXT D
3Ø5 IF BL<36 THEN PRINT#-2, CHR$(26)
31Ø END
1ØØØ FM=M+1
     : GY=Y
1Ø1Ø IF M<3 THEN FM=M+13
     : GY=Y-1
1Ø2Ø N=INT(365.25*GY)+INT(3Ø.6*FM)-621Ø48
1Ø3Ø IF ((Y=17ØØ AND M>2) OR Y>17ØØ) AND ((Y=18ØØ AND
     M<3) OR Y<18ØØ) THEN N=N+2
1Ø4Ø IF ((Y=18ØØ AND M>2) OR Y>18ØØ) AND ((Y=19ØØ AND
     M<3) OR Y<19ØØ) THEN N=N+1
1Ø5Ø N=N-INT(N/7)*7
1Ø6Ø RETURN
```

Perpetual Calendar

Kenneth J. Heberle
116 Goodrich
Erie, PA 16508

The enclosed is a perpetual calendar written for the Color Computer. I believe you had already printed a perpetual calendar in your newsletter before I started getting it, but this one has several features which make it unique.

First of all, it is good until about the year 3000 with only minor changes as mentioned below. Second, and perhaps more important, most "movable" holidays are calculated, and are also good for over 3000 years. "Fixed" holidays, birthdays, etc. are easily added to the DATA statements at the end of the program.

The only maintenance required is the yearly updating of the current year in line #40 and the once-a-century changing of the current century in line #260. The "Yearshift" in line #320 is optional and can be used to start the current 12-month year at a month other than January. This can be handy in the last few months of a year. No other adjustments should ever be needed until around the year 3000, when our present calendar will need to be adjusted slightly.

The whole thing takes about 6K. I hope you can use this in your newsletter.

```
1Ø ' ***  PERPETUAL CALENDAR  ***
2Ø ' (YEARSHIFT @ 32Ø)
3Ø CLEAR 4ØØ
     : CLS(7)
     : SOUND 5Ø, 3
4Ø CY$="1981"   ' CURRENT YEAR
45 DIM HOL$(31)
5Ø ED=99
     : LM=31
55 MH$="Ø414Ø4Ø3Ø323Ø411Ø331Ø418Ø4Ø8Ø328Ø416Ø4Ø5Ø3
     5Ø413Ø4Ø2Ø322Ø41ØØ33ØØ417Ø4Ø7Ø327"
6Ø DY$="ØØØØ31Ø59Ø9Ø12Ø151181212243273304334"
7Ø MN$="JANUARY  FEBRUARY MARCH    APRIL    MAY
     JUNE     JULY     AUGUST   SEPTEMBEROCTOBER
     NOVEMBER DECEMBER "
8Ø AD$="SUNDAY    MONDAY    TUESDAY   WEDNESDAY
     THURSDAY  FRIDAY    SATURDAY  "
9Ø DZ$="  SUN MON TUE WED THU FRI SAT "
1ØØ CLS   ' BEGIN
1Ø5 SOUND 2ØØ, 2
11Ø PRINT
     : PRINT
     : PRINT
12Ø PRINT TAB(6) "perpetual calendar"
13Ø PRINT
     : PRINT
14Ø PRINT " ENTER A DATE (YEARS 1753-   )"
145 PRINT
15Ø PRINT "  (FORMATS:  MM/DD, MM/DD/YYYY,"
16Ø PRINT " MM/DD/YY, MM/YYYY, OR JUST MM)"
165 PRINT
     : PRINT
17Ø SOUND 2ØØ, 2
     : SOUND 2ØØ, 2
     : INPUT "ENTER DATE OR END "; DT$
18Ø LL=LEN(DT$)
19Ø IF DT$="END" THEN 9999
2ØØ IF LL=Ø THEN 1ØØ
2Ø1 YR$="Ø"
21Ø P1=INSTR(1, DT$, "/")
     : P2=INSTR(P1+1, DT$, "/")
22Ø IF P1=Ø THEN MO=VAL(DT$)
     : DA=1
```

```
     : YR$=CY$
     : GOTO 3ØØ
23Ø MO=VAL(LEFT$(DT$, P1-1))
24Ø IF P2=Ø THEN 27Ø
25Ø DA=VAL(MID$(DT$, P1+1, (P2-1)-P1))
26Ø IF LL-P2>3 THEN YR$=RIGHT$(DT$, 4) ELSE
     YR$=STR$(VAL("19"+RIGHT$(DT$, 2)))
 265 GOTO 3ØØ
 27Ø IF LL-P1>3 THEN YR$=RIGHT$(DT$, 4)
     : DA=1 ELSE YR$=CY$
     : DA=VAL(RIGHT$(DT$, LL-P1))
 3ØØ YR=VAL(YR$)
 315 '  *** YEARSHIFT ***
 32Ø IF LL<5 AND YR$=CY$  AND MO<9 THEN YR=YR+1
     : YR$=STR$(YR)
 325 ' ******************
 4ØØ '
 41Ø IF YR<1753 AND SW=Ø THEN GOSUB 15ØØ
 42Ø IF MO>12 OR MO<1 THEN DA=1
     : GOTO 14ØØ
 43Ø IF DA<1 THEN 14ØØ
 45Ø LP=Ø
 46Ø IF (YR/1ØØ-INT(YR/1ØØ))=Ø THEN I=INT(YR/4ØØ)*4ØØ
     ELSE I=INT(YR/4)*4
 47Ø IF I=YR THEN LP=1
 48Ø LD=365+LP
 5ØØ IF MO=2 THEN 6ØØ
 51Ø IF MO=4 OR MO=6 OR MO=9 OR MO=11 THEN 7ØØ
 52Ø IF DA>31 THEN 14ØØ
 53Ø LM=31
     : GOTO 75Ø
 599 '
 6ØØ LM=28+LP
 61Ø IF DA>LM THEN 14ØØ
 62Ø GOTO 75Ø
 7ØØ LM=3Ø
 71Ø IF DA>LM THEN 14ØØ
 74Ø '    PRINT ROUTINES
 75Ø IF MO<3 THEN LP=Ø
 76Ø N=MO*3
 77Ø JUL=VAL(MID$(DY$, N-2, 3))
 78Ø JUL=JUL+DA+LP
 79Ø N=MO*9
 8ØØ PM$=MID$(MN$, N-8, 9)
 81Ø DT=YR+ INT((YR-1)/4)- INT((YR-17Ø1)/1ØØ)+
     INT((YR-16Ø1)/4ØØ)+ JUL
 82Ø IF P1=Ø OR (P2=Ø AND LL>5) THEN 1ØØØ
 84Ø '
 85Ø '   DAY PRINT ROUTINE
 855 SOUND 1ØØ, 2
     : SOUND 1ØØ, 2
 86Ø DW=(DT/7)
     : WKDY=INT((DW-INT(DW))*7+.5)
 87Ø O1=WKDY*1Ø+1
 88Ø WKDY$=MID$(AD$, O1, 1Ø)
 9ØØ '
 95Ø CLS
     : PRINT
     : PRINT
     : PRINT
 96Ø PRINT "THE DATE "; DT$; " = "; WKDY$
 961 IF LL>5 THEN 963
 963 PRINT
     : JD$=YR$+"."+STR$(JUL)
 965 PRINT " THE JULIAN DATE = "; JD$
 969 SOUND 25Ø, 4
 97Ø PRINT
     : PRINT
     : PRINT "WOULD YOU LIKE TO SEE"
 98Ø INPUT " THE WHOLE MONTH? (Y OR N) "; R$
 985 IF R$="Y" THEN 1ØØØ
 99Ø IF R$="N" THEN 1ØØ ELSE DT$=R$
     : GOTO 18Ø
 999 '
1ØØØ '   PRINT WHOLE MONTH
1Ø1Ø DD=Ø
     : HS=Ø
1Ø2Ø SOUND 1ØØ, 2
     : SOUND 1ØØ, 2
1Ø3Ø MS=(DT-(DA-1))/7
1Ø4Ø D1=INT((MS-INT(MS))*7+.5)
1Ø5Ø CLS
1Ø6Ø PRINT TAB(8) PM$; TAB(18) YR$
1Ø7Ø PRINT DZ$
1Ø8Ø GOSUB 13ØØ
11ØØ PL$=""
11Ø5 FOR WK=1 TO 7
111Ø IF DD=D1 THEN DP=1
112Ø IF DP<1Ø THEN DP$=" "+STR$(DP) ELSE DP$=STR$(DP)
1125 IF DP=Ø THEN DP$="   "
1126 IF DP>ED AND WK=1 THEN GOSUB 125Ø
1127 IF HOL$(DP)<>"" THEN DP$=" **"
     : HS=1
113Ø PL$=PL$+" "+DP$
114Ø DD=DD+1
115Ø IF DP<>Ø THEN DP=DP+1
116Ø IF DP>LM THEN DP=Ø
     : DP$=" "
117Ø NEXT WK
118Ø PRINT
     : PRINT PL$
119Ø IF DP=Ø THEN 12ØØ
1195 GOTO 11ØØ
12ØØ PRINT
12Ø5 IF HS=Ø THEN 17Ø
12Ø7 SOUND 2ØØ, 2
     : SOUND 2ØØ, 2
121Ø INPUT " ENTER DATE OR * "; R$
122Ø IF R$="*" THEN 2ØØØ
123Ø DT$=R$
     : GOTO 18Ø
125Ø IF HOL$(DP)<>"" THEN HOL$(DP)="EASTER
     SUNDAY"+CHR$(13)+"   & "+HOL$(DP) ELSE
     HOL$(DP)="EASTER SUNDAY"
126Ø ED=99
127Ø RETURN
13ØØ '
131Ø '  SET MONTH'S HOLIDAYS
132Ø GOSUB 8ØØØ
133Ø GOSUB 3ØØØ
1335 RESTORE
134Ø READ HDT$, HOL$
1345 IF HDT$="END" THEN RETURN
135Ø MT=VAL(LEFT$(HDT$, 2))
1355 IF LEN(HDT$)>5 AND YR<>VAL(RIGHT$(HDT$, 4)) THEN
     134Ø
136Ø IF MT<>MO THEN 134Ø
1365 HDT$=LEFT$(HDT$, 5)
137Ø DX=VAL(RIGHT$(HDT$, 2))
138Ø IF HOL$(DX)="" THEN HOL$(DX)=HOL$ ELSE
     HOL$(DX)=HOL$(DX)+CHR$(13)+"   & "+HOL$
139Ø GOTO 134Ø
1399 '
14ØØ CLS
     : PRINT@ 2ØØ, "invalid date"
14Ø5 IF DA>LM THEN PRINT
     : PRINT " FORMATS ARE:   MM/YYYY OR MM/DD,"
     : PRINT TAB(7) " - NOT  MM/YY!"
141Ø SCREEN Ø, 1
     : SOUND 1, 1Ø
1415 S9=1
142Ø FOR D= 1 TO 6ØØ
     : NEXT D
1425 IF DA>LM AND S9<4 THEN S9=S9+1
     : GOTO 142Ø
143Ø GOTO 1ØØ
1499 '
15ØØ '  TOO OLD
151Ø CLS
     : PRINT@38, "***  caution  ***""
1515 SOUND 1, 2
     : SOUND 1, 2
1516 SOUND 1, 2
     : SOUND 1, 2
152Ø PRINT
     : PRINT
     : PRINT"     OUR PRESENT CALENDAR WAS"
153Ø PRINT"  ADOPTED IN 1752  -  ACCURACY"
154Ø PRINT"  FOR DATES EARLIER THEN 1753"
155Ø PRINT"  MAY REQUIRE CONVERSION"
1565 PRINT
     : PRINT "*(MOST DATES IN AMERICAN HISTORY HAVE
     ALREADY BEEN CONVERTED)
```

```
157Ø PRINT
     : PRINT
     : INPUT "HIT <ENTER> TO CONTINUE "; R$
1575 SW=1
158Ø RETURN
2ØØØ '  PRINT HOLIDAYS
2Ø1Ø CLS
     : SOUND 25Ø, 4
2Ø25 IF HS=Ø THEN 22ØØ
2Ø3Ø PRINT" IMPORTANT DATE(S) IN "; PM$
2Ø35 PRINT STRING$(32, "*")
2Ø4Ø FOR H=1 TO LM
2Ø45 IF HOL$(H)="" THEN 2Ø6Ø
2Ø5Ø PRINT H; TAB(5) HOL$(H)
2Ø6Ø NEXT H
2Ø65 PRINT@48Ø, "";
2Ø7Ø INPUT "ENTER DATE OR NULL "; R$
2Ø8Ø IF R$="" THEN 1Ø1Ø
2Ø9Ø DT$=R$
     : GOTO 18Ø
22ØØ PRINT " NO HOLIDAYS,  BIRTHDAYS, OR "
221Ø PRINT " ANYTHING AT ALL IN "; PM$
225Ø GOTO 2Ø65
2999 '
3ØØØ '  MOVABLE HOLIDAYS
3Ø1Ø ON MO GOSUB 3Ø5Ø, 31ØØ, 39ØØ, 39ØØ, 32ØØ, 33ØØ,
     3Ø5Ø, 3Ø5Ø, 34ØØ, 36ØØ, 35ØØ, 3Ø5Ø
3Ø5Ø RETURN
3Ø99 '
31ØØ IF D1<2 THEN HX=16-D1 ELSE HX=23-D1
312Ø HOL$(HX)="WASHINGTON'S HOLIDAY"
313Ø RETURN
32ØØ HX=15-D1
32Ø5 IF D1=Ø THEN HX=8
321Ø HOL$(HX)="MOTHER'S DAY"
3215 HX=3Ø-D1
322Ø IF D1=6 THEN HX=31
323Ø HOL$(HX)="MEMORIAL DAY **"
324Ø HX=21-D1
325Ø HOL$(HX)="ARMED FORCES DAY"
326Ø RETURN
33ØØ HX=22-D1
3305 IF D1=Ø THEN HX=15
331Ø HOL$(HX)="FATHER'S DAY"
332Ø RETURN
34ØØ IF D1<2 THEN HX=2-D1 ELSE HX=9-D1
341Ø HOL$(HX)="LABOR DAY **"
342Ø RETURN
35ØØ IF D1<2 THEN HX=3-D1 ELSE HX=1Ø-D1
351Ø HOL$(HX)="ELECTION DAY"
352Ø IF D1>4 THEN HX=33-D1 ELSE HX=26-D1
353Ø HOL$(HX)="THANKSGIVING  **"
354Ø RETURN
36ØØ IF D1<2 THEN HX=9-D1 ELSE HX=16-D1
361Ø HOL$(HX)="COLUMBUS DAY"
362Ø RETURN
39ØØ '   EASTER SUNDAY
391Ø FM=YR/19
392Ø PFM=INT((FM-INT(FM))*19+.5)
393Ø PX=PFM*4+1
394Ø PFM$=MID$(MH$, PX, 4)
395Ø EM=VAL(LEFT$(PFM$, 2))
     : EH=VAL(RIGHT$(PFM$, 2))
396Ø IF EM=MO THEN ED=EH ELSE ED=99
397Ø D2=D1
     :  IF D2=Ø THEN D2=7
398Ø IF EM=3 AND MO=4 AND EH>31-D2 THEN ED=Ø
399Ø RETURN
7999 '
8ØØØ ' CLEAR HOLIDAYS
8Ø1Ø FOR IX=1 TO 31
8Ø2Ø HOL$(IX)=""
8Ø3Ø NEXT IX
8Ø4Ø RETURN
8999 '
9ØØØ '   HOLIDAYS, ETC.
9Ø1Ø DATA Ø4/15, INCOME TAXES DUE!!!
9Ø2Ø DATA Ø1/Ø1, NEW YEARS DAY  **
9Ø4Ø DATA Ø7/Ø4, INDEPENDENCE DAY **
9Ø5Ø DATA Ø8/13, OUR ANNIVERSARY
9Ø8Ø DATA 12/25, CHRISTMAS DAY **
9Ø9Ø DATA Ø6/Ø7, MARCIA'S BIRTHDAY
91ØØ DATA 1Ø/Ø2, KEN'S BIRTHDAY
911Ø DATA Ø2/12, LINCOLN'S BIRTHDAY
912Ø DATA Ø2/14, VALENTINE'S DAY
915Ø DATA Ø3/17, ST. PATRICK'S DAY
916Ø DATA Ø1/24, JEFF'S BIRTHDAY
917Ø DATA Ø7/23, DAVE'S BIRTHDAY
919Ø DATA Ø4/24, TIM'S BIRTHDAY
92ØØ DATA Ø6/14, FLAG DAY
922Ø DATA 1Ø/31, HALLOWEEN
923Ø DATA 11/11, VETERAN'S DAY
93ØØ DATA Ø3/2Ø, 1ST DAY OF SPRING
931Ø DATA Ø6/21, 1ST DAY OF SUMMER
932Ø DATA Ø9/22, 1ST DAY OF AUTUMN
934Ø DATA 12/21, 1ST DAY OF WINTER
941Ø DATA 12/Ø7, PEARL HARBOR DAY
944Ø DATA Ø4/Ø1/198Ø, 1ST DAY OF PASSOVER
945Ø DATA Ø4/19/1981, 1ST DAY OF PASSOVER
946Ø DATA Ø4/Ø8/1982, 1ST DAY OF PASSOVER
947Ø DATA Ø3/29/1983, 1ST DAY OF PASSOVER
948Ø DATA Ø4/17/1984, 1ST DAY OF PASSOVER
949Ø DATA Ø4/Ø6/1985, 1ST DAY OF PASSOVER
95ØØ DATA 12/Ø3/198Ø, 1ST DAY OF HANUKKAH
951Ø DATA 12/21/1981, 1ST DAY OF HANUKKAH
952Ø DATA 12/11/1982, 1ST DAY OF HANUKKAH
953Ø DATA 12/Ø1/1983, 1ST DAY OF HANUKKAH
954Ø DATA 12/19/1984, 1ST DAY OF HANUKKAH
955Ø DATA 12/Ø8/1985, 1ST DAY OF HANUKKAH
99ØØ DATA END, ***
9999 STOP
```

Linefeed with a Carriage Return

Ed Hamilton
P.O. Box 943
Santa Rosa, CA 95402

I am currently using a printer (TELETYPE MODEL 43) that does not perform an automatic linefeed when a carriage return is sent. Since the Color Computer expects this to be the case, my printouts all end up on one line - UGH! This 6809E code inserts a patch into the operating system to intercept the CR character and issue both the linefeed and carriage return.

The code works with either regular or Extended Basic. It resides in the highest 19 bytes of memory and is not affected by resets, although (obviously) the program must be entered after every power-on.

THE BASIC PROGRAM

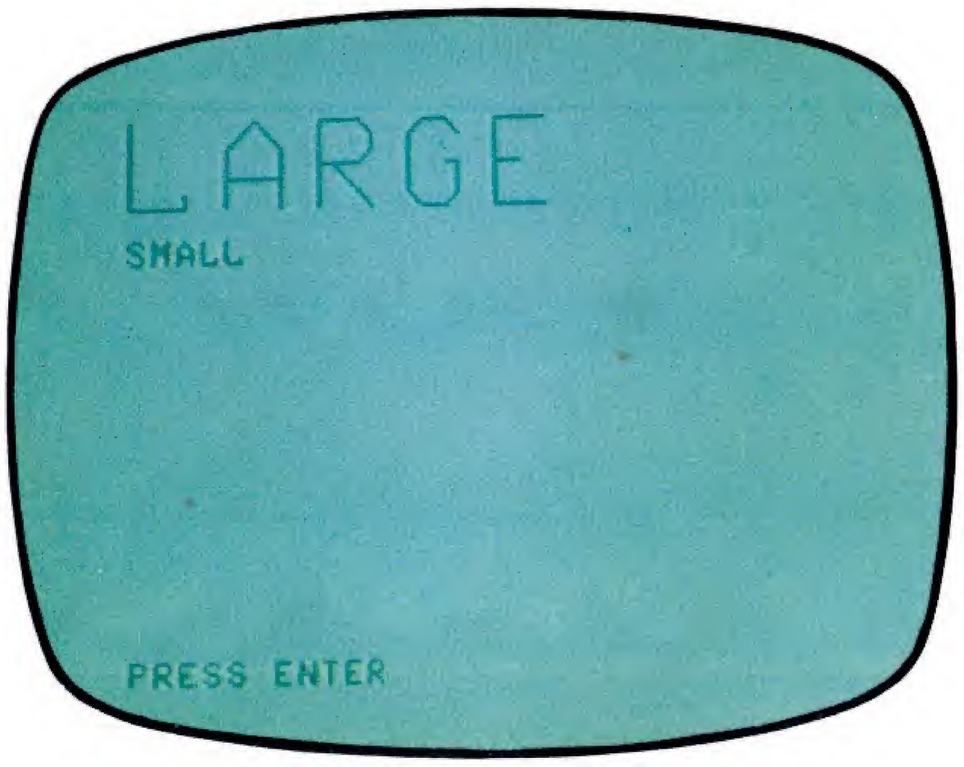
```
1Ø 'O/S PATCH FOR LF ON CR
1ØØ 'PUT CODE AT MEMTOP- 19
11Ø MT=PEEK(116)*256+PEEK(117)
112 MT=MT-19+12
12Ø FOR I=Ø TO 18
122 READ T
124 POKE MT+I,T
126 NEXT I
13Ø 'SAVE O/S CODE
132 POKE MT+16,PEEK(359)
134 POKE MT+17,PEEK(36Ø)
136 POKE MT+18,PEEK(361)
14Ø 'PUT JMP IN O/S HANDLER
142 AH=INT(MT/256)
144 AL=MT-AH*256
146 POKE 359,126
148 POKE 36Ø, AH
     : POKE 361,AL
15Ø 'MACHINE-LANGUAGE CODE
151 DATA 129,13,38,12,15Ø,111
152 DATA 76,42,5,134,1Ø,189
153 DATA 162,133,134,13,Ø,Ø,Ø
2ØØ 'RESERVE MEMORY
21Ø CLEAR 2ØØ,MT
999 END
```

Hi-Res Character Generator

Ron Van Dyke
52 East McKinley
Zeeland, MI 49464

This program will allow you to display alphanumeric characters on a graphic screen. Instructions are included in the program.

```
1Ø 'CHAR-GEN BY ron van dyke
2Ø 'DATE:  Ø9/13/81
3Ø '
4Ø PMODE 1, 1
     : PCLS 1
     : SCREEN 1, Ø
5Ø DRAW "S8; C3; BM7Ø, 12"
     : AA$="CHAR-GEN"
     : GOSUB 13ØØØ
6Ø DRAW "S16; C2; BM6Ø, 44"
     : AA$="C"
     : GOSUB 13ØØØ
7Ø DRAW "C3"
     : AA$="O"
     : GOSUB 13ØØØ
8Ø DRAW "C4"
     : AA$="L"
     : GOSUB 13ØØØ
9Ø DRAW "C2"
     : AA$="O"
     : GOSUB 13ØØØ
1ØØ DRAW "C3"
     : AA$="R"
     : GOSUB 13ØØØ
11Ø DRAW "S8; C4; BM7Ø, 64"
     : AA$="COMPUTER"
     : GOSUB 13ØØØ
12Ø DRAW "C2; BM55, 1ØØ"
     : AA$="++++++++++"
     : GOSUB 13ØØØ
13Ø DRAW "C4; BM65, 12Ø"
     : AA$="CHARACTER"
     : GOSUB 13ØØØ
14Ø DRAW "BM65, 14Ø"
     : AA$="GENERATOR"
     : GOSUB 13ØØØ
15Ø DRAW"BM6Ø, 16Ø"
     : AA$="SUBROUTINE"
     : GOSUB 13ØØØ
16Ø FOR T=Ø TO 2ØØØ
     : NEXT T
17Ø CLS
     : PRINT TAB(11) "char-gen"
     : Q$=CHR$(34)
     : PRINT
18Ø PRINT "TO USE CHAR-GEN MERGE IT WITH"
19Ø PRINT "THE PROGRAM THAT YOU DESIRE AND"
2ØØ PRINT "CALL IT AS A SUBROUTINE USING"
21Ø PRINT "THE FOLLOWING PROCEDURE:"
22Ø PRINT
23Ø PRINT "FIRST YOU MUST DECIDE WHICH"
24Ø PRINT "GRAPHIC MODE YOU WILL BE USING."
25Ø PRINT "IF THE GRAPHIC MODE IS ANYTHING"
26Ø PRINT "OTHER THAN PMODE4 YOU MUST"
27Ø PRINT "SCALE YOUR CHARACTERS TO"
28Ø PRINT "AT LEAST S8."
29Ø PRINT
     : INPUT "PRESS ENTER TO CONTINUE"; X
     : CLS
3ØØ PRINT "NEXT USE THE DRAW COMMAND TO"
31Ø PRINT "MOVE THE STARTING POSITION TO"
32Ø PRINT "DESIRED BEGINNING POINT."
33Ø PRINT
     : PRINT CHR$(123) "note" CHR$(125) " THE
     ROUTINE STARTS EACH"
34Ø PRINT "CHARACTER AT IT'S LOWER LEFT"
35Ø PRINT "CORNER. BE SURE TO GO LOW ENOUGH"
36Ø PRINT "NOW SET THE STRING VARIABLE"
37Ø PRINT "AA$ EQUAL TO THE STRING YOU"
38Ø PRINT "WISH TO BE PRINTED AND CALL"
39Ø PRINT "THE SUBROUTINE AT 13ØØØ"
4ØØ PRINT
     : INPUT "PRESS ENTER TO CONTINUE"; X
     : CLS
41Ø PRINT "THE FOLLOWING IS A SAMPLE"
42Ø PRINT "PROGRAM SHOWING HOW TO USE"
43Ø PRINT "CHAR-GEN."
     : PRINT
44Ø PRINT "1Ø PMODE 1, Ø:PCLS1:SCREEN 1, Ø
45Ø PRINT "2Ø DRAW" Q$ "C3; S8; BM1Ø, 95" Q$
46Ø PRINT "3Ø AA$=" Q$ "THIS IS A TEST" Q$
47Ø PRINT "4Ø GOSUB 13ØØØ
48Ø PRINT "5Ø DRAW" Q$ "C2; BM1Ø, 18Ø" Q$
49Ø PRINT "6Ø AA$=" Q$ "PRESS ENTER" Q$
5ØØ PRINT "7Ø GOSUB 13ØØØ"
51Ø PRINT "8Ø IF INKEY$=" Q$ ; Q$ " GOTO 8Ø
52Ø PRINT
     : INPUT "PRESS ENTER TO SEE SAMPLE"; X
53Ø PMODE 1, 1
     : PCLS
     : SCREEN 1, Ø
54Ø DRAW"C3; S8; BM1Ø, 95"
55Ø AA$="THIS IS A TEST"
     : GOSUB 13ØØØ
56Ø DRAW"C2; BM1Ø, 18Ø"
     : AA$="PRESS ENTER"
57Ø GOSUB 13ØØØ
58Ø IF INKEY$="" GOTO 58Ø
59Ø CLS
     : PRINT
     : PRINT "DID YOU NOTICE THE C2 IN LINE"
6ØØ PRINT "2Ø AND THE C3 IN LINE 5Ø"
61Ø PRINT "THE 'C' SUBCOMMAND CHANGES THE"
62Ø PRINT "COLOR SET OF OUR CHARACTERS"
63Ø PRINT
     : PRINT "LET'S TRY ANOTHER SAMPLE USING"
64Ø PRINT "THE HIGHEST RESOLUTION MODE"
     : PRINT
     : PRINT
     : INPUT "PRESS ENTER TO CONTINUE"; X
65Ø CLS
     : PRINT
     : PRINT
     : PRINT "1Ø PMODE 4, 1:PCLS1:SCREEN 1, Ø
66Ø PRINT "2Ø DRAW" Q$ "C Ø; S16; BM2Ø, 5Ø" Q$
67Ø PRINT "3Ø AA$=" Q$ "LARGE" Q$
68Ø PRINT "4Ø GOSUB 13ØØØ
69Ø PRINT "5Ø DRAW" Q$ "S4; BM2Ø, 65" Q$
7ØØ PRINT "6Ø AA$=" Q$ "SMALL" Q$
71Ø PRINT "7Ø GOSUB 13ØØØ
72Ø PRINT "8Ø DRAW" Q$ "BM2Ø, 18Ø" Q$
73Ø PRINT "9Ø AA$=" Q$ "PRESS ENTER" Q$
735 PRINT "1ØØ GOSUB 13ØØØ
74Ø PRINT "11Ø IF INKEY$=" Q$; Q$ " GOTO 11Ø
75Ø PRINT
     : INPUT "PRESS ENTER TO SEE SAMPLE"; X
76Ø PMODE 4, 1
     : PCLS 1
     : SCREEN 1, Ø
     : DRAW"C Ø; S16; BM2Ø, 5Ø"
     : AA$="LARGE"
     : GOSUB 13ØØØ
77Ø DRAW"S4; BM2Ø, 65"
     : AA$="SMALL"
     : GOSUB 13ØØØ
78Ø DRAW"BM2Ø, 18Ø"
     : AA$="PRESS ENTER"
79Ø GOSUB 13ØØØ
8ØØ IF INKEY$="" THEN 8ØØ
95Ø CLS
     : PRINT "ONE FINAL NOTE:
96Ø PRINT "THIS ROUTINE USES INFORMATION"
97Ø PRINT "STORED IN DATA STATEMENTS AND"
98Ø PRINT "A RESTORE COMMAND,  THIS CAN"
99Ø PRINT "CAUSE MAJOR PROBLEMS IF USED"
```




```
1000 PRINT "WITH PROGRAMS CONTAINING DATA"
1010 PRINT "STATEMENTS.  YOU MAY HAVE TO"
1020 PRINT "RENUMBER THE PROGRAMS SO THAT"
1030 PRINT "THE SUBROUTINE IS AHEAD OF"
1040 PRINT "YOUR PROGRAM AND THEN ADD"
1050 PRINT "DUMMY READ STATEMENTS TO READ"
1060 PRINT "ALL DATA THAT WOULD INTERFERE"
1070 PRINT "WITH YOUR PROGRAM. BEYOND THIS"
1080 PRINT "YOUR ON YOUR OWN."
1090 INPUT " PRESS ENTER"; X
1100 CLS
     : PRINT
     : PRINT
     : PRINT
     : PRINT "PRESSING ENTER AT THIS POINT"
1110 PRINT "WILL DELETE LINES 10 THRU 1140
     LEAVING ONLY THE CHAR-GEN       SUBROUTINE."
1120 PRINT "BE SURE TO SAVE THE SUBROUTINE  AFTER
     PRESSING ENTER.
1130 PRINT
     : PRINT
     : INPUT "PRESS ENTER"; X
1140 CLS
     : DEL 10-1140
13000 ' char-gen
13001 FOR XX=1 TO LEN(AA$)
13002 RESTORE
     : LL=0
13003 READ LL$, CC$
13004 IF LL$=MID$(AA$, XX, 1) THEN DRAW CC$
     : GOTO 13006
13005 LL=LL+1
     : IF LL<48 THEN 13003
13006 NEXT
     : RETURN
13007 DATA " ", "BM+7, 0"
13008 DATA "A", "U4; E2; F2; D2; NL4; D2; BM+3,
     0"
13009 DATA "B", "U6; R3; F1; D1; G1; NL3; F1; D1;
     G1; L3; BM+7, 0"
13010 DATA "C", "BM+1, -0; H1; U4; E1; R2; F1;
     BM+0, +4; G1; L2; BM+6, 0"
13011 DATA "D", "U6; R3; F1; D4; G1; L3; BM+7, 0"
13012 DATA "E", "NR4; U3; NR2; U3; R4; BM+3, +6"
13013 DATA "F", "U3; NR2; U3; R4; BM+3, +6"
13014 DATA "G", "BM+1, -0; H1; U4; E1; R2; F1;
     BM+0, +2; NL1; D2; G1; L2; BM+6, 0"
13015 DATA "H", "U3; NU3; R4; NU3; D3; BM+3, 0"
13016 DATA "I", "BM+1, 0; R1; NR1; U6; NL1; R1;
     BM+4, +6"
13017 DATA "J", "BM+0, -1; F1; R1; E1; U5; NL1;
     R1; BM+3, 6"
13018 DATA "K", "U3; NU3; R1; NE3; F3; BM+3, 0"
13019 DATA "L", "NU6; R4; U1; BM+3, +1"
13020 DATA "M", "U6; F2; ND1; E2; D6; BM+3, 0"
13021 DATA "N", "U6; F1; D1; F2; D1; F1; NU6;
     BM+3, 0"
13022 DATA "O", "BM+1, 0; H1; U4; E1; R2; F1; D4;
     G1; L2; BM+6, 0"
13023 DATA "P", "U6; R3; F1; D1; G1; L3; BM+7, 3"
13024 DATA "Q", "BM+1, 0; H1; U4; E1; R2; F1; D3;
     G1; NH1; NF1; G1; L1; BM+6, 0"
13025 DATA "R", "U6; R3; F1; D1; G1; L2; NL1; F3;
     BM+3, 0"
13026 DATA "S", "BM+0, -1; F1; R2; E1; U1; H1;
     L2; H1; U1; E1; R2; F1; BM+3, +5"
13027 DATA "T", "BM+2, +0; U6; NL2; R2; BM+3, +6"
13028 DATA "U", "BM+0, -1; NU5; F1; R2; E1; U5;
     BM+3, 6"
13029 DATA "V", "BM+0, -6; D2; F1; D1; F1; ND1;
     E1; U1; E1; U2; BM+3, +6"
13030 DATA "W", "NU6; E2; NU1; F2; U6; BM+3, 6"
13031 DATA "X", "U1; E4; U1; BM-4, 0; D1; F4; D1;
     BM+3, 0"
13032 DATA "Y", "BM+0, -6; D2; F2; ND2; E2; U2;
     BM+3, 6"
13033 DATA "Z", "NR4; U1; E4; U1; L4; BM+7, 6"
13034 DATA "1", "BM+1, 0; R1; NR1; U6; G1; BM+6,
     +5"
13035 DATA "2", "NR4; U1; E1; R1; E2; U1; H1; L2;
     G1; BM+7, +5"
13036 DATA "3", "BM+0, -1; F1; R2; E1; H2; E2;
     H1; L3; BM+7, 6"
13037 DATA "4", "BM+3, 0; U2; NR1; L3; U1; E3;
     D3; BM+4, 3"
13038 DATA "5", "BM+0, -1; F1; R2; E1; U2; H1;
     L3; U2; R4; BM+3, +6"
13039 DATA "6", "BM+4, -5; H1; L2; G1; D4; F1;
     R2; E1; U1; H1; L3; BM+7, +3"
13040 DATA "7", "U1; E4; U1; L4; BM+7, +6"
13041 DATA "8", "BM+1, -0; H1; U1; E1; H1; U1;
     E1; R2; F1; D1; G1; NL2; F1; D1; G1; L2;
     BM+6, 0"
13042 DATA "9", "BM+0, -1; F1; R2; E1; U4; H1;
     L2; G1; D1; F1; R2; BM+4, +3"
13043 DATA "/", "U1; E4; U1; BM+3, 6"
13044 DATA "?", "BM+0, -5; E1; R2; F1; D1; G2;
     BM+0, +1; D1; BM+5, +0"
13045 DATA "!", "BM+2, +1; U1; BM+0, -2; U5;
     BM+5, 7"
13046 DATA ".", "BM+2, 0; U1; BM+5, +1"
13047 DATA ":", "BM+2, -1; U1; BM+0, -2; U1;
     BM+5, +5"
13048 DATA ";", "BM+1, 0; E1; U1; BM+0, -1; U1;
     BM+5, +4"
13049 DATA ",", "BM+2, 0; NU1; G1; BM+6, -1"
13050 DATA "'", "BM+1, -5; E2; BM+4, +7"
13051 DATA "-", "BM+0, -3; R4; BM+3, +3"
13052 DATA "+", "BM+2, -1; U2; NU2; NL2; R2;
     BM+3, +3"
13053 DATA "=", "BM+1, -2; R3; BM-3, -2; R3;
     BM+4, +4"
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CompuServe Phone Numbers As of January 9, 1982

On the end of each phone number displayed you will see the letter C, T, or W. This tells you if the number is a CompuServe proprietary network number, a TYMNET (supplementary network) number, or a WATS number. Unless otherwise noted, the telephone numbers listed are for 300 Baud operation only.

There are different access charges associated with the use of numbers in each of these categories. The following outlines the current rates (01/09/82) for non-prime time use:

C - CompuServe
300 Baud $5.00/Hour
1200 Baud $17.50/Hour

T - Tymnet
300 Baud $5.00/Hour
1200 Baud $17.50/Hour
PLUS a $2.00/hour surcharge at either baud rate.

W - WATS $5.00/Hour plus
$15.00/HR. surcharge

ALABAMA	
BIRMINGHAM	AL 205 942-4141T 300/1200
HUNTSVILLE	AL 205 539-3753T 300/1200
MOBILE	AL 205 432-3382T 300/1200
MONTGOMERY	AL 205 834-3410T
ARKANSAS	
FT SMITH	AR 501 782-3210T 1200 ONLY
JONESBORO	AR 501 932-6886T 300/1200
LITTLE ROCK	AR 501 372-5780T
LITTLE ROCK	AR 501 376-3768T 1200 ONLY
SPRINGDALE	AR 501 756-2201T 300/1200
ARIZONA	
PHOENIX	AZ 602 254-5811T
PHOENIX	AZ 602 994-8495C
PHOENIX	AZ 602 249-3862T 1200 ONLY
TUCSON	AZ 602 790-0764T
TUCSON	AZ 602 748-2004C
TUCSON	AZ 602 747-4097T 1200 ONLY
CALIFORNIA	
ALHAMBRA	CA 213 572-0999T
ANAHEIM	CA 714 991-8060C
ANTIOCH	CA 415 757-6855T
ARCADIA	CA 213 757-6855T
BURLINGAME	CA 415 348-4992T
EL SEGUNDO	CA 213 640-1570T
EL SEGUNDO	CA 213 640-1281T 1200 ONLY
FRESNO	CA 209 432-1500T
HAYWARD	CA 415 785-3431T
LONG BEACH	CA 213 435-7088T 300/1200
LOS ANGELES	CA 213 623-8500T
LOS ANGELES	CA 213 626-2400T
LOS ANGELES	CA 213 626-0365T 300/1200
LOS ANGELES	CA 213 739-8906C
LOS ANGELES	CA 213 387-9431C 1200 ONLY
MARINA DEL REY	CA 213 821-2257T
MISSION HILLS	CA 213 365-2013T
MODESTO	CA 209 578-4236T
MOUNTAIN VIEW	CA 415 961-7242C
MOUNTAIN VIEW	CA 415 941-8450T
MOUNTAIN VIEW	CA 415 961-7971T
MOUNTAIN VIEW	CA 415 949-0330T 1200 ONLY
NEWPORT BEACH	CA 714 631-6421C
NEWPORT BEACH	CA 714 540-9560T
NEWPORT BEACH	CA 714 540-0951T 1200 ONLY
NORTHRIDGE	CA 213 998-4872T 300/1200
NORWALK	CA 213 865-2066T 300/1200
OAKLAND	CA 415 836-6700T
OAKLAND	CA 415 836-8900T 1200 ONLY
PALM SPRINGS	CA 714 320-0772T
PALO ALTO	CA 415 591-5591C
PASADENA	CA 213 577-8722T 300/1200
PLEASANT HILL	CA 415 798-2093T
RANCHO BERNARDO	CA 714 487-6540C
RANCHO BERNARDO	CA 714 485-1990T
RIVERSIDE	CA 714 825-9372T
RIVERSIDE	CA 714 824-8170T 1200 ONLY
SACRAMENTO	CA 916 448-8151T 300/1200
SALINAS	CA 408 443-4333T
SAN CLEMENTE	CA 714 498-3130T
SAN DIEGO	CA 714 279-4472C
SAN DIEGO	CA 714 692-0219T
SAN DIEGO	CA 714 291-8700T
SAN DIEGO	CA 714 293-3590T 1200 ONLY
SAN FRANCISCO	CA 415 956-4191C
SAN FRANCISCO	CA 415 397-4300T
SAN FRANCISCO	CA 415 986-8200T
SAN FRANCISCO	CA 415 982-5543C 1200 ONLY
SAN FRANCISCO	CA 415 788-7955T 1200 ONLY
SAN JOSE	CA 408 249-5361C
SAN JOSE/CUPERT	CA 408 446-1470T
SAN JOSE	CA 415 249-2775C 1200 ONLY
SAN JOSE	CA 408 446-7309T 1200 ONLY
SAN MATEO	CA 415 591-5591C
SAN PEDRO	CA 213 830-0775T
SANTA BARBARA	CA 805 682-9641T
SANTA CRUZ	CA 408 429-9572T 300/1200
SANTA ROSA	CA 707 575-0160T
SANTA ROSA	CA 707 546-6776T 1200 ONLY
VAN NUYS	CA 213 986-9503T
VAN NUYS	CA 213 989-6047C
VENTURA/OXNARD	CA 805 487-0482T
VENTURA/OXNARD	CA 805 486-4536T 1200 ONLY
VISTA	CA 714 727-6011T
W. COVINA	CA 213 331-3954T
WALNUT CREEK	CA 415 932-0116T
COLORADO	
COLORADO SPRGS	CO 303 475-2121T 300/1200
DENVER	CO 303 830-9003T
DENVER	CO 303 830-9043T
DENVER	CO 303 629-5563C
DENVER	CO 303 830-9083T 1200 ONLY
DENVER	CO 303 571-0351C 1200 ONLY
GRAND JUNCTION	CO 303 241-1885C
CONNECTICUT	
BRIDGEPORT	CT 203 366-5555C
BRIDGEPORT	CT 203 579-7820T
BRIDGEPORT	CT 203 367-6021T
DANBURY	CT 203 743-1340T
DANBURY	CT 203 743-1650T 1200 ONLY
DARIEN	CT 203 655-8931T
DARIEN	CT 203 655-7951T 1200 ONLY
FAIRFIELD	CT 203 579-7820T
FAIRFIELD	CT 203 333-4926T 1200 ONLY
HARTFORD	CT 203 242-7140T
HARTFORD	CT 203 236-2581C
HARTFORD	CT 203 242-7417T 1200 ONLY
NEW HAVEN	CT 203 789-0579T
NEW HAVEN	CT 203 787-1702T 1200 ONLY
STAMFORD	CT 203 324-6630C
WATERBURY	CT 203 573-0771C
WATERBURY	CT 203 755-1153T
WESTPOINT	CT 203 222-1748C
DISTRICT OF COLUMBIA	
WASHINGTON	DC 202 452-8930C
WASHINGTON	DC 703 734-3900T
WASHINGTON	DC 703 442-3900T
WASHINGTON	DC 703 841-9560T
WASHINGTON	DC 703 841-0200T
WASHINGTON	DC 202 822-8985C 1200 ONLY
WASHINGTON	DC 703 442-7800T 1200 ONLY
WASHINGTON	DC 703 841-3550T 1200 ONLY
WASHINGTON	DC 703 734-8370T 1200 ONLY
DELAWARE	
WILMINGTON	DE 302 658-5261T
WILMINGTON	DE 302 658-8611T 1200 ONLY
FLORIDA	
DAYTONA BEACH	FL 904 252-4481T
FT LAUDERDALE	FL 305 467-7750T
FT. LAUDERDALE	FL 305 467-3807T 1200 ONLY
JACKSONVILLE	FL 904 246-9961C
JACKSONVILLE	FL 904 721-8100T
MELBOURNE	FL 305 725-8011T
MIAMI	FL 305 667-3564C
MIAMI	FL 305 624-7900T 300/1200
ORLANDO	FL 305 851-3530T
ORLANDO	FL 305 859-7670T 1200 ONLY
PENSACOLA	FL 904 434-0134T
SARASOTA	FL 813 365-3526T
ST. PETERSBURG	FL 813 535-6441T
ST. PETERSBURG	FL 813 535-1446T 1200 ONLY
TAMPA	FL 813 977-2400T
TAMPA	FL 813 876-1060C
TAMPA	FL 813 977-3891T 1200 ONLY
W. PALM BEACH	FL 305 622-2871T
GEORGIA	
ATLANTA	GA 404 237-9333C
ATLANTA	GA 404 659-2910T
ATLANTA	GA 404 659-6670T
ATLANTA	GA 404 581-0619T 1200 ONLY
ATLANTA	GA 404 231-1392C 1200 ONLY
SAVANNAH	GA 912 352-7259T
IOWA	
CEDAR RAPIDS	IA 319 363-2482T
CEDAR RAPIDS	IA 319 363-9019T 1200 ONLY
DAVENPORT	IA 319 322-5642T
DAVENPORT	IA 319 324-7197T
DES MOINES	IA 515 288-6640T
DES MOINES	IA 515 288-8097T 1200 ONLY
IOWA CITY	IA 319 354-7371T
IOWA CITY	IA 319 354-9532T 1200 ONLY
WATERLOO	IA 319 233-9227T 300/1200
IDAHO	
BOISE	ID 208 343-4851T
BOISE	ID 208 344-4311T 1200 ONLY
ILLINOIS	
CHICAGO	IL 312 372-0391T
CHICAGO	IL 312 368-4607T
CHICAGO	IL 312 443-1250C
CHICAGO	IL 312 346-4961T
CHICAGO	IL 312 368-4700T
CHICAGO	IL 312 641-1630T 1200 ONLY
CHICAGO	IL 312 782-5717C 1200 ONLY
FREEPORT	IL 815 233-5585T
JOLIET	IL 815 723-9854T 300/1200
PEORIA	IL 309 673-2156T
ROCKFORD	IL 815 398-6090T
SPRINGFIELD	IL 217 753-7905T 300/1200
INDIANA	
EVANSVILLE	IN 812 423-6885T
FT. WAYNE	IN 219 424-5162T
HIGHLAND	IN 219 836-5452T
INDIANAPOLIS	IN 317 638-2517C
INDIANAPOLIS	IN 317 257-3461T
INDIANAPOLIS	IN 317 926-1253T 1200 ONLY
INDIANAPOLIS	IN 317 634-8821C 1200 ONLY
MARION	IN 317 662-0091T
MERRILLVILLE	IN 219 769-7254T
SOUTH BEND	IN 219 233-4163T
KANSAS	
SHAWNEE MISSION	KS 913 677-2833T
SHAWNEE MISSION	KS 913 677-0707T 1200 ONLY
TOPEKA	KS 913 233-0690T
WICHITA	KS 316 265-1241T
WICHITA	KS 316 264-7386T 1200 ONLY
KENTUCKY	
LEXINGTON	KY 606 253-3463T
LEXINGTON	KY 606 253-3498T 1200 ONLY
LOUISVILLE	KY 502 581-9526C
LOUISVILLE	KY 502 361-3881T
LOUISVILLE	KY 502 581-9733C 1200 ONLY
LOUISVILLE	KY 502 361-2645T 1200 ONLY
LOUISIANA	
BATON ROUGE	LA 504 292-4050T
BATON ROUGE	LA 504 292-2650T 1200 ONLY
LAFAYETTE	LA 318 235-3501T 300/1200
NEW ORLEANS	LA 504 524-4371T 300/1200
NEW ORLEANS	LA 504 948-9542C
NEW ORLEANS	LA 504 948-9593C 1200 ONLY
SHREVEPORT	LA 318 688-4666T 300/1200
MASSACHUSETTS	
BILLINGHAM	MA 617 466-0993C
BOSTON	MA 617 236-4241C
BOSTON	MA 617 482-4677T
BOSTON	MA 617 247-2930C 1200 ONLY
BOSTON	MA 617 482-3386T 1200 ONLY
CONCORD	MA 617 371-0354C
HUDSON	MA 617 568-8019C
MAYNARD	MA 617 897-8743C
MEDFIELD	MA 617 359-7603C
MEDWAY	MA 617 533-2722C
MENDON	MA 617 478-0653C
SPRINGFIELD	MA 413 781-6830T
SPRINGFIELD	MA 413 781-0145T 1200 ONLY
WESTBORO	MA 617 366-8577C
WORCESTER	MA 617 754-9451T
WORCESTER	MA 617 755-5601T 1200 ONLY
MARYLAND	
BALTIMORE	MD 301 547-8100T 300/1200
BALTIMORE	MD 301 787-0743C
BALTIMORE	MD 301 787-0270C 1200 ONLY
ROCKVILLE	MD 301 770-1680T
MAINE	
PORTLAND	ME 207 773-2029T
PORTLAND	ME 207 773-1557T 1200 ONLY
MICHIGAN	
ANN ARBOR	MI 313 665-2627T
ANN ARBOR	MI 313 662-8282T 1200 ONLY
CADILLAC	MI 616 775-1261T 300/1200
DETROIT	MI 313 963-2353T
DETROIT	MI 313 964-4745C
DETROIT	MI 313 963-3388T
DETROIT	MI 313 963-3198C 1200 ONLY
DETROIT	MI 313 963-8880T 1200 ONLY
E. LANSING	MI 517 372-2928C
FLINT	MI 313 732-7303T 300/1200
GRAND RAPIDS	MI 616 459-5069T
GRAND RAPIDS	MI 616 456-9092T 1200 ONLY
JACKSON	MI 517 787-9461T
KALAMAZOO	MI 616 388-3534T
KALAMAZOO	MI 616 385-3150T
KALAMAZOO	MI 616 344-2298C
KALAMAZOO	MI 616 349-6753T 1200 ONLY
LANSING	MI 517 487-2040T
PLYMOUTH	MI 313 459-8900T
PLYMOUTH	MI 313 459-8100T 1200 ONLY
SOUTHFIELD	MI 313 569-8350T
ST. JOSEPH	MI 616 429-2568T
TRAVERS CITY	MI 616 946-0002T
MINNESOTA	
MANKATO	MN 507 625-1684T 300/1200
MINNEAPOLIS	MN 612 339-5200T
MINNEAPOLIS	MN 612 332-3881C
MINNEAPOLIS	MN 612 339-8086T
MINNEAPOLIS	MN 612 339-2415T 1200 ONLY
ROCHESTER	MN 507 282-3741T 300/1200
MISSOURI	
BRIDGETON	MO 314 731-2304T
COLUMBIA	MO 314 875-1150T
JEFFERSON CITY	MO 314 634-3237T
JEFFERSON CITY	MO 314 634-3273T 1200 ONLY
JOPLIN	MO 417 782-3037T 300/1200
KANSAS CITY	MO 913 677-2833T
KANSAS CITY	MO 816 474-3770C
KANSAS CITY	MO 913 677-0707T 1200 ONLY
KANSAS CITY	MO 816 421-0938C 1200 ONLY
SPRINGFIELD	MO 417 831-0566T 300/1200
ST JOSEPH	MO 816 232-0624T 300/1200
ST. LOUIS	MO 314 432-7585C
ST. LOUIS	MO 314 421-5110T
ST. LOUIS	MO 314 621-4660T 1200 ONLY
MISSISSIPPI	
JACKSON	MS 601 944-0860T
JACKSON	MS 601 969-5141T 1200 ONLY
PASCAGOULA	MS 601 769-6502T
PASCAGOULA	MS 601 769-6673T 1200 ONLY
MONTANA	
BUTTE	MT 406 494-2998T 300/1200
NORTH CAROLINA	
ASHEVILLE	NC 704 255-0021T 300/1200
CHARLOTTE	NC 704 376-2545T
CHARLOTTE	NC 704 333-6654C
CHARLOTTE	NC 704 376-2544T 1200 ONLY
CHARLOTTE	NC 704 333-7128C 1200 ONLY
DURHAM	NC 919 549-0441T
DURHAM	NC 919 549-8910T 1200 ONLY
GREENSBORO	NC 919 379-0034T
GREENSBORO	NC 919 379-0470T
GREENSBORO	NC 919 275-9455T 1200 ONLY
HIGH POINT	NC 919 885-0171T
RALEIGH	NC 919 832-6592T 300/1200
WINSTON-SALEM	NC 919 725-1414T
WINSTON-SALEM	NC 919 725-9252T 1200 ONLY
NEBRASKA	
LINCOLN	NE 402 475-8659T
OMAHA	NE 402 392-2970T
OMAHA	NE 402 345-4390C 300/1200
OMAHA	NE 402 397-0414T 1200 ONLY
NEW HAMPSHIRE	
MANCHESTER	NH 603 623-8859T
MERRIMACK	NH 603 880-1450C
NASHUA	NH 603 882-0435T
NEW JERSEY	
ENGLEWOOD	NJ 201 894-8250T
HACKETTSTOWN	NJ 201 852-3342C
LYNDHURST	NJ 201 460-0100T
LYNDHURST	NJ 201 460-0180T 1200 ONLY
MOORESTOWN	NJ 609 235-3761T
MORRISTOWN	NJ 201 267-3997T 300/1200
NEWARK/UNION	NJ 201 483-5937T
NEWARK UNION	NJ 201 483-4878T 1200 ONLY
PATERSON	NJ 201 684-3434C
PATERSON	NJ 201 279-1335C 1200 ONLY
PISCATAWAY	NJ 201 981-1900T
PLAINSBORO	NJ 609 452-2097C
PRINCETON	NJ 609 452-8970T
PRINCETON	NJ 609 452-8560T 1200 ONLY
RIDGEWOOD	NJ 201 447-6175T
WAYNE	NJ 201 785-4480T
NEW MEXICO	
ALBUQUERQUE	NM 505 843-6301T 300/1200
NEVADA	
LAS VEGAS	NV 702 293-0300T
RENO	NV 702 882-7810T
RENO-CARSON CTY	NV 702 882-6546T 1200 ONLY
NEW YORK	
ALBANY	NY 518 463-3111T
ALBANY	NY 518 434-2633T 1200 ONLY
BUFFALO	NY 716 845-6610T
BUFFALO	NY 716 837-9650C
BUFFALO	NY 716 847-0500T 1200 ONLY
CORNING	NY 607 962-5071T
CORNING	NY 607 936-4151T 1200 ONLY
ELMIRA	NY 607 737-9010T 300/1200
HEMPSTEAD L.I	NY 516 872-6500T
HEMPSTEAD L.I.	NY 516 872-6612T 1200 ONLY
HICKSVILLE L.I.	NY 516 681-7240C
HUNTINGTON L.I.	NY 516 549-2780T
HUNTINGTON L.I	NY 516 421-1614T 1200 ONLY
LONG ISLAND	NY 516 673-5780T
NEW YORK CITY	NY 212 683-0131T
NEW YORK CITY	NY 212 685-4414T
NEW YORK CITY	NY 212 354-1522C
NEW YORK CITY	NY 212 532-0437T
NEW YORK CITY	NY 212 785-5400T
NEW YORK CITY	NY 212 944-2175C 1200 ONLY
NEW YORK CITY	NY 212 944-2705C 1200 ONLY
NEW YORK CITY	NY 212 921-0094C 1200 ONLY
NEW YORK CITY	NY 212 532-8101T 1200 ONLY
NEW YORK CITY	NY 212 668-5400T 1200 ONLY
NIAGARA FALLS	NY 716 285-6691T
NIAGARA FALLS	NY 716 284-0054C
NIAGARA FALLS	NY 716 285-3114T 1200 ONLY
POUGHKEEPSIE	NY 914 473-7815T
ROCHESTER	NY 716 248-8000T
ROCHESTER	NY 716 248-8350T 1200 ONLY
SYRACUSE	NY 315 437-7111T
SYRACUSE	NY 315 437-1117T 1200 ONLY
WHITE PLAINS	NY 914 694-9361T
WHITE PLAINS	NY 914 428-9270C
WHITE PLAINS	NY 914 328-9580T
WHITE PLAINS	NY 914 694-8960T 1200 ONLY
OHIO	
AKRON	OH 216 867-1237C
AKRON	OH 216 535-1861T
CANTON	OH 216 455-2518C
CINCINNATI	OH 513 579-0908C
CINCINNATI	OH 513 891-7211T
CINCINNATI	OH 513 793-8893T
CINCINNATI	OH 513 791-5311T 1200 ONLY
CLEVELAND	OH 216 566-0657C
CLEVELAND	OH 216 781-7050T
CLEVELAND	OH 216 861-5383T 1200 ONLY
CLEVELAND	OH 216 579-9496C 1200 ONLY
CLEVELAND	OH 216 579-1840C 1200 ONLY
CLEVELAND	OH 216 579-1839C 1200 ONLY
COLUMBUS	OH 614 421-7270T
COLUMBUS	OH 614 457-2105C
COLUMBUS	OH 614 457-8227C 1200 ONLY
COLUMBUS	OH 614 421-1650T 1200 ONLY
DAYTON	OH 513 223-3847T
DAYTON	OH 513 461-5117C
DAYTON	OH 513 461-6400T 1200 ONLY
DAYTON	OH 513 461-5759C 1200 ONLY
GRANVILLE	OH 614 587-0932C
MARYSVILLE	OH 513 642-2015T 300/1200
TOLEDO	OH 419 255-1732C
TOLEDO	OH 419 243-3144T
TOLEDO	OH 419 255-8116C
TOLEDO	OH 419 255-2946T 1200 ONLY
YOUNGSTOWN	OH 216 744-5326T 300/1200
OKLAHOMA	
OKLAHOMA CITY	OK 405 947-0561T
OKLAHOMA CITY	OK 405 949-0125T 1200 ONLY
TULSA	OK 918 582-0507T
TULSA	OK 918 743-5808C
TULSA	OK 918 742-5456C 1200 ONLY
TULSA	OK 918 665-2750T 1200 ONLY
OREGON	
PORTLAND	OR 503 231-4050T
PORTLAND	OR 503 231-4077T 1200 ONLY
PENNSYLVANIA	
ALLENTOWN	PA 215 433-6131T
ALLENTOWN	PA 215 432-5926T 1200 ONLY
ALTOONA	PA 814 946-8888T 300/1200
DOWNINGTON	PA 215 269-9861T
ERIE	PA 814 453-7161T
HARRISBURG	PA 717 236-1190T
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